BULLETIN OF THE
VANDERBILT MARINE MUSEUM

VOLUME II

Scientific Results of the Cruises of the Yachts "Eagle" and "Ara", 1921-1928, William K. Vanderbilt, Commanding.

CRUSTACEA: STOMATOPODA AND BRACHYURA

By LEE BOONE

Library,
U. S. Fisheries Biological Station,
Seattle, Washington.

ANNOUNCEMENT.

The Vanderbilt Marine Museum is the privately owned depository of the marine collections of William K. Vanderbilt, Esquire, and is located on his country estate, "Eagle's Nest," Huntington, Long Island, New York. It contains extensive collections of natural history and ethnological specimens, all of which were personally collected by Mr. Vanderbilt, in various parts of the world during the past thirty-odd years.

The scientific publications of the museum consist of a series of Bulletins, designed to disseminate results of research based on the marine zoological collections, every specimen of which was personally collected by Mr. Vanderbilt, during a series of cruises in his yachts "Eagle" and "Ara." Volume I of the Bulletin series consists of reports on the fishes collected during these cruises, by Dr. N. A. Borodin. Volume II, the present report, consists of a report of the Stomatopod and Brachyuran Crustacea of the cruises of the yachts "Eagle" and "Ara," 1921–1928, by Lee Boone.

These Bulletins are available for distribution to scientific establishments by purchase, or by exchange for equivalent research reports in related subjects. They may be obtained by addressing Mr. Vanderbilt at the Vanderbilt Marine Museum, Huntington, Long Island, N. Y.

Other bulletins will be issued from time to time, as made desirable by the results of research on the Vanderbilt collections. Two additional volumes are now in press.

Digitized by the Internet Archive
in 2026

https://archive.org/details/bulletinofvander0002leeb_p6i6

341
.V28
v.2

BULLETIN OF THE VANDERBILT MARINE MUSEUM

VOLUME II

Library
Pacific Salmon Investigations
U. S. Fish & Wildlife Service
Seattle, Washington.

Scientific Results of the Cruises of the Yachts "Eagle" and "Ara", 1921-1928, William K. Vanderbilt, Commanding.

CRUSTACEA: STOMATOPODA AND BRACHYURA

By LEE BOONE

Huntington, L. I., New York, U.S.A.
Printed Privately
September 1, 1930.

Copyright 1930, by
LEE BOONE

THE SCIENCE PRESS PRINTING COMPANY
LANCASTER, PA.

"Bright the wide ocean's blue
Flashes azure and rose
Taking its tint from the sky.

Then as light filters through
Deep, still deeper it goes
Stranger the fish that swim by.

Till far under things true
Still lives sheltered and grows
Many a long buried lie."

John T. Nichols.

TO

MRS. WILLIAM K. VANDERBILT

TABLE OF CONTENTS

	Page	Plate	Figure
Announcement	8		
Introduction	9		
Acknowledgments	11		
Geographic distribution of the species	11		
West Indian fauna	11–17		
Labrador–New England fauna	17		
Tropical American Pacific fauna	17		
Mediterranean fauna	19–20		
Order Stomatopoda	21		
Family: Squillidae	21		
Genus: Gonodactylus	21		
oerstedii	21	1	
Genus Pseudosquilla	24		
ciliata var. occidentalis	24	2	
Genus Lysiosquilla	29		
maculata	29	3	
Genus Squilla	32		
mantis	32	4	
alba	35	5	
panamensis var. B.	39	6	
(Alima) gracilis	42		
Order Brachyura	42		
Subtribe Dromiacea	42		
Family Dromidae	42		
Genus Dromidia	42		
antillensis	42	7	A, B
Tribe Oxystomata	45		
Family Dorippidae	45		
Genus Dorippe	45		
lanatus	45	8	
Family Raninidae	48		
Genus Raninoidea	48		
laevis lamarcki	48	9	A, B, C
Family Leucosiidae	53		
Subfamily Leucosiinae	53		
Genus Persephona	53		
edwardsii	53	10	A
punctata	54	10	B
orbicularis	56	11	A, B
Genus Randallia	59		
ornata	59	12	
Family Matutidae	60		
Genus Hepatulus	60		
princeps	60	13	

	Page	Plate	Figure
Family Calappidae	62		
Genus Calappa	62	14	
Subtribe Brachygnatha	65		
Superfamily Oxyrhyncha	65		
Family	65		
Subfamily Inachinae	65		
Genus Stenorynchus	65		
seticornis	65	15, 16	
longirostris	68	17	
Genus Inachus	70		
dorsettensis	70	18	
Genus Podochela	71		
riisei	71	19	
Genus Anasimus	74		
latus	74	20	
Genus Collodes	76		
granosus	76	21	A, B
Genus Dasygius	78		
depressus	78	22	
Subfamily Pisinae	80		
Genus Hyas	80		
coarctatus	80	23	
Genus Nibilia	82		
antilocapra	82	24	A
Genus Libinia	84		
dubia	84	24	B
Subfamily Majinae	86		
Genus Pitho	86		
aculeata	86	25	A, B
anisodon	87	26	
Genus Mithrax	89		
hispidus	89	27	
pleuracanthus	92	28	A
acuticornis	93	29	A
cornutus	96	28	B
holderi	97	29	B
coryphe	99	30	A
forceps	100	30	B
Genus Stenocionops	102		
furcata	102	31	
Genus Macrocoeloma	105		
eutheca	105	32	B
trispinosum	108	33	A, B, C, D
Genus Microphrys	110		
bicornutus	110	32	A
Genus Maia	113		
verrucosa	113	34	

	Page	Plate	Figure
Family Parthenopidae	115		
Genus Parthenope	115		
agonus	115	35	
serrata	117	36	A, B
pourtalesii	120	37	
Superfamily Brachyryncha	123		
Family Xanthidae	123		
Genus Leptodius	123		
floridanus	123	38	A, B
Genus Glyptoxanthus	125		
vermiculatus	125	39	A, B
Genus Heteractea	127		
lunata	127	40	A
Genus Lophopanopeus	129		
heathii	129	41	
Subfamily Menippinae	130		
Genus Menippe	130		
mercenaria	130	42	
Genus Carpilius	132		
corallinus	132	43	
Genus Lobopilumnus	134		
agassizii	134	40	B
Genus Micropanope	137		
spinipes	137	44	A
Genus Pilumnus	139		
brasiliensis	139	45	
spinifer	140	44	B
floridanus	141	46	
Subfamily Eriphinae	143		
Genus Eriphia	143		
squamata	143	47	A
gonagra	144	47	B
Genus Eriphides	145		
hispida	145	48	
Family Cancridae	148		
Genus Cancer	148		
borealis	148	49	
amaenus	150	50	
Family Portunidae	153		
Genus Bathynectes	153		
longipes	153	51	A
Genus Callinectes	154		
sapidus	154	52	
larvatus	157	53	
Genus Portunus (Portunus)	158		
sulcatus	158	54	
vocans	161	55	A

	Page	Plate	Figure
xantusi	163	56	A, B
sayi	165	55	B
corrugatus	167	57	
holsatus	170	58	A
Genus Portunus (Achelous)	172		
ordwayi	174	58	B
sebae	177	60	
spinimanus	179	61	
spinicarpus	183	62	
depressifrons	185	63	
Genus Lupella	187		
forceps	187	64	A, B
Subfamily Podopthalminae	190		
Genus Euphylax	190		
dovii	190	65	
Family Goneplacidae	194		
Subfamily Goneplacinae	194		
Genus Goneplax	194		
tridentata	194	66	A
angulata	197	66	B
Subfamily Prionoplacinae	199		
Genus Speocarcinus	199		
carolinensis	199	67	
Subfamily Rhizopinae	201		
Genus Chasmocarcinus	201		
latipes	201	68	A, B
Family Grapsidae	203		
Subfamily Grapsinae	203		
Genus Grapsus	203		
grapsus	203	69	
Subfamily Sesarminae	207		
Genus Aratus	207		
pisonii	207	70	
Subfamily Plagusiinae	209		
Genus Percnon	209		
gibbesi	209	71	
Family Gecarcinidae	212		
Genus Cardisoma	212		
guanhumi	212	72	
Family Ocypodidae	215		
Subfamily Ocypodinae	215		
Genus Ocypode	215		
albicans	215	73	
Genus Uca	220		
pugnax	220	74	C
coloradoensis	221	74	A, B

CRUSTACEA: STOMATOPODA AND BRACHYURA, CRUISES OF THE "EAGLE" AND "ARA," 1921-1928, WILLIAM K. VANDERBILT, COMMANDING.

By Lee Boone.

Introduction

The Crustacean collection of the Vanderbilt Marine Museum, herein reported, was obtained by Mr. William K. Vanderbilt on a series of cruises conducted in his yachts, *"Eagle"* and *"Ara,"* during parts of the years 1921 to 1928, inclusive.

Four distinctly separate faunal regions are involved in these explorations: (*a*) The West Indian region, from which the greater percentage of species was obtained. Separate cruises during the years 1921, 1922, 1923, 1924 and 1925 were conducted by Mr. Vanderbilt in this region. Some very valuable material was obtained in the West Indies in 1926 and also in 1928, supplementing the Galapagan expeditions of those years.

(*b*) The Labrador-New England region is represented by material collected in the waters of Newfoundland, Nova Scotia, eastern Canada, the coast of Maine and of New York, including Long Island Sound, in 1921, 1922, 1924 and 1926.

(*c*) The tropical American Pacific fauna is represented by explorations in the Galapagos Islands, the west coast of Costa Rica and of Panama, including the Perlas Islands, and Cocos Island, also several deep-sea stations in this region, during the expeditions of 1926 and 1928.

(*d*) The Mediterranean fauna, with especial reference to the north coasts of Morocco, deep-sea dredgings off the coast of southern France, off Sardinia and off Monaco and explorations of the littoral fauna of the Adriatic Sea.

The bathymetric distribution of the species taken in each of these

major regions ranges from terrestrial and littoral to true deep-sea forms, the deep-sea stations ranging in depth from 300 to 1100 fathoms.

Considered systematically, the collection embraces Stomatopoda, Brachyura, Anomura, Macrura, Schizopoda, Isopoda, Amphipoda, Mysidacea, Cirripedia and Copepoda. The first two groups form the subject of the present volume. The remainder comprise volume three of the bulletin series of the Vanderbilt Marine Museum, now in press. The annotated discussion of the collection is presented with reference to its systematic classification. A list of the species found in each major faunal region is given also.

The great value of the collection lies in the astonishing number of rare species it possesses and in the related extension of our knowledge of the geographic and bathymetric distribution of these forms, as presented in the systematic discussion. Much hitherto unpublished data on the colors of the various species was made in field-sketches by Mr. Vanderbilt, during all of the cruises, except those to the Galapagos Islands, on which his staff artist, Mr. W. E. Belanske, continued this work under Mr. Vanderbilt's direction. A few of these color plates of the Crustacea have been published in Mr. Vanderbilt's "To the Galapagos on the *'Ara'* "; a great many more are in the study collections of the Vanderbilt Marine Museum. This volume also contains complete maps of the cruises of 1926 and 1928. Valuable notes on the habits of some of the species were made in the field by Mr. Vanderbilt; these notes have been augmented by field-notes made by the present writer while on various expeditions during the past decade.

It is hoped that this contribution to our knowledge of the Crustacea of the four major faunal regions discussed may serve to stimulate interest in this remarkable group of neglected Arthropods. The Crustacea, represented by many thousands of valid species, are a very vital factor in the ecology of the sea. Yet the group, comparable in its diversification, complex structures and remarkable life-histories with their strange metamorphoses, to the great class Insecta, has been curiously neglected. Probably less than a hundred species have had their life-histories studied. Little is known of the habits of even the common species; with the exception of a few reliable books, the systematic literature is scattered, poorly illustrated and subject to many errors traceable to poor microscopy. There is great need for the thorough monographic study of the Crustacea of the world. Such a work would be invaluable to all students of oceanography.

ACKNOWLEDGMENTS.

I am inexpressibly indebted to Mr. Vanderbilt for the splendid facilities he has placed at my disposal throughout the investigation. His unfailing generosity and helpful criticisms and suggestions during the course of this work have been invaluable.

During the preparation of the report I have enjoyed full privileges of research in the American Museum of Natural History, and am especially indebted to Dr. R. W. Miner, curator of the Department of Lower Invertebrates, and to Miss Hazel Gay and Miss Margaret Titcomb, of the Library. I wish to thank Mrs. Helen Ziska, also of the American Museum, for her exquisitely skillful preparation of the line drawings in this report, also for the careful retouching of the photographic illustrations which were made by Mr. Julius Kirschner and Mr. W. H. Southwick, of the American Museum. I am also under obligation to the authorities of the Tropical Research Station, New York Zoölogical Society, the Museum of Comparative Zoölogy at Harvard University, the Philadelphia Academy of Natural Sciences, the British Museum of Natural History, the Museum National d'Histoire Naturelle Paris, L'Institute Oceanographique, Monaco, Stazione Zoölogica di Napoli, the Museu Paulista, Sao Paulo, Brazil, the Copenhagen Museum and the Calcutta Museum, for friendly assistance in making comparison with various types and rare species in these respective depositories, to each of whom I tender appreciative acknowledgment of their courtesies.

GEOGRAPHICAL DISTRIBUTION OF THE SPECIES.

WEST INDIAN FAUNA.

Stomatopoda.

Gonodactylus oerstedii Hansen.

Three specimens, Bimini, November, 1924; one specimen, Florida Keys, March, 1924; two specimens, Florida Keys, February, 1924; one specimen, Port Antonio, Jamaica, February, 1926; one, Cay Sal Bank, Double Headed Shot Cay, Bahamas, Feb. 18, 1925.

Pseudosquilla ciliata var. *occidentalis* Borradaile.

Five specimens dredged in 30 fms., S. W. of Marquesas Keys, Fla., March 2, 1924; five specimens, Florida Keys, March, 1924.

Lysiosquilla maculata (Fabricius).

One large specimen, Florida Keys, March, 1924. Very rare.

Squilla mantis Latreille.

One specimen, Porto Padre, Cuba, March, 1928.

Squilla alba R. P. Bigelow.

One specimen, Limon Bay, Panama, February 26, 1926; one specimen, Nuevitas Bay, Cuba, February 26, 1923. Very rare.

Squilla (Alima) gracilis Milne Edwards.

Several specimens, taken with electric light, Egg Island Harbor, W. I., January 19, 1925.

Brachyura.

Dromidia antillensis Stimpson.

One female, Knight's Key, Florida; one female, Florida Keys, tag 492, 1924; one male, Turtle Harbor, Florida, November, 1924. Rare.

Raninoides laevis lamarcki A. Milne Edwards and Bouvier.

One ovigerous female, dredged in 70 fms., S. W. of Marquesas Keys, Florida, March 2, 1924. (Also found in the Pacific.) Very rare.

Persephona punctata Linné.

A male and a female, Colon, Panama, shallow water, 1926; a male, Limon Bay, Panama, 2 fms., January 21, 1928.

Hepatulus princeps (Herbst).

One male, Limon Bay, Panama, February 26, 1926; two males, south of Catalina Creek, Cuba, February 14, 1924, 5 fms.

Rare; illustrated for the first time since Herbst's primitive figure, 1794.

Calappa flammea (Herbst).

One male, 7 fms., Bury Island, Bahamas, January 19, 1925; one male, dredged in 3 fms., Bimini, B. W. I.

Stenorynchus seticornis Herbst.

Five males and one female, Porto Padre, Cuba, March 4, 1926, 3.5 fms.; three males and one female dredged in 70 fms., S. W. of Marquesas Keys, Fla., March 2, 1924; one male, Miami Beach, Fla., April 27, 1922.

Podochela riisei Stimpson.

One male, dredged in 15 fms., Bury Island Flats, Bahamas, January

22, 1925; one male, off Knight's Key, Florida, March 29, 1926; one female, dredged in 50 fms., American Shoal, Florida.

Anasimus latus Rathbun.

One male, dredged in 70 fms., S. W. of Marquesas Keys, Fla., March 2, 1924. Very rare.

Nibilia antilocapra (Stimpson).

Four specimens, dredged in 150 fms., seven miles off Alligator Reef, Fla. Rare; bathymetric occurrence greatly increased by the *"Ara"* material.

Pitho aculeata (Gibbes).

One specimen, Cardenas, Cuba, March, 1928.

Pitho anisodon (von Martens).

Nine specimens, Cardenas, Cuba, March, 1928; two, Pilon, Cuba, February, 1928.

Mithrax (Mithrax) hispidus (Herbst).

One female, Miami, Florida; one male, Florida Reefs, 1923; one young female, dredged in 7 fms., Bury Islands, Bahamas, January 19, 1925.

Mithrax (Mithrax) pleuracanthus (Stimpson).

One female, Cardenas, Cuba, March, 1928; one ovigerous female, off Knight's Key, Fla., March, 1926; one ovigerous female, Port Antonio, Jamaica, 2 fms., February, 1926, 2 fms.; two, Cay Sal Bank, Double Headed Shot Cay, Bahamas, February 18, 1925.

Mithrax (Mithrax) cornutus de Saussure.

Hogsty Key, San Salvador, one specimen.

Mithrax (Mithrax) holderi Stimpson.

One male, Port Tanamo, Cuba, February 3, 1924; one male, Turtle Harbor, Florida, November 20, 1923; one specimen, dredged in 20 fms., off the south end of Sand Key Light, Key West, Fla., January 29, 1923; one specimen, Marquesas Keys, Fla., 22 fms.

Mithrax (Mithrax) acuticornis Stimpson.

One male, Cualeo Reales, Cuba, February, 1923. This establishes the first Cuban record of a rare species.

Mithrax (Mithraculus) coryphe (Herbst).

Five specimens, Port Antonio, Jamaica, 2 fms., January 17, 1926.

Mithrax (Mithraculus) forceps (A. Milne Edwards).

Two specimens, Cualeo Reales, Cuba, February, 1923; two, Bay Biscayne, Miami, Fla. Two, Carenge Bay, Le Mole, Haiti.

Stenocionops furcata (Olivier).

One female, Port Tanamo, Cuba, February 3, 1924, 2 fms.; one, dredged 14 miles S. W. of Marquesas Keys, Florida, 30 fms., sandy.

Macrocoeloma eutheca Stimpson.

One female, dredged in 20 fms., off Sand Key Light, Key West, Fla., January 29, 1924.

Macrocoeloma trispinosum (Latreille).

Twenty specimens, Cardenas, Cuba, March 5, 1928; one large specimen, south coast of Cuba, February 19, 1923.

Microphrys bicornutus (Latreille).

One female, Pigeon Key, Florida, April 17, 1923; one male, Hogsty Island, San Salvador, February, 1926; two males, Cardenas, Cuba, March 5, 1928.

Parthenope (Parthenope) agonus (Stimpson).

Two ovigerous females, American Shoal Light, Fla., March 3, 1924.

Parthenope (Platylambrus) serrata H. Milne Edwards.

Two males and one female, Porto Padre, Cuba; one male, 50 fms., American Shoal Light, Florida, March 3, 1924; one male, Segua la Grande, Cuba, 3 fms., February 23, 1925. Rare; this establishes the maximum depth for the species.

Parthenope (Platylambrus) pourtalesii (Stimpson).

One male and one female, dredged in 150 fms., 7 miles off Alligator Reef, Fla. Rare; this establishes the maximum depth for the species.

Leptodius floridanus (Gibbes).

One male, one female, Pigeon Key, Fla., April 19, 1923.

Glyptoxanthus vermiculatus (Lamarck).

One female, 5 fms., south of Catalina Creek, Cuba, February 14, 1924. Very rare; second record of the species and only one with exact locality.

Menippe mercenaria (Say).

Bay Biscayne, at Miami, Fla., March, 1923. Figured for the first time since 1880.

Carpilius corallinus (Herbst).

One specimen, Cape Haitien, Haiti, March, 1928, from which the first authentic color plate was made by W. E. Belanske. One specimen, Turtle Harbor, Fla., 1923. Quite rare.

Lobopilumnus agassizii (Stimpson).

One male, S. E. coast of Cuba, February 19, 1923. Rare.

Micropanope spinipes (A. Milne Edwards).

Five specimens, Cualeo Reales Channel, Cuba, February 18, 1923. Rare. First Cuban record of the species. One female, Marquesas Keys, Florida, March 2, 1924. Very rare.

Pilumnus brasiliensis Miers.

Carenge Bay, Le Mole, Haiti, February 4, 1924. Rare. First Haitian record of the species.

Pilumnus floridanus Stimpson.

One specimen, dredged in 3 fms., Cape Cruz, Cuba, February 11, 1924. Rare. First Cuban record of the species.

Cancer borealis Stimpson.

One very large male, dredged in 1100 fms., off Miami, Florida, March 3, 1926, with a species of a rare deep-sea barnacle, *Poecilasma inequilaterale* Pilsbry, attached.

This record establishes the most remarkable depth for the species; also an unusual southern extension of its range. It is an abundant littoral species in the Labrador-New Engand fauna, from the tide-line to 100 fms.

Callinectes sapidus M. J. Rathbun.

One specimen, Miami, Fla., 1923.

Callinectes larvatus Ordway.

One specimen, Miami, Florida.

Portunus (Portunus) sulcatus (A. Milne Edwards).

One male, electric light, Miami, Fla. Rare.

Portunus (Portunus) vocans (A. Milne Edwards).

Carenge Bay, Le Mole, Haiti, February 4, 1924. Very rare.

Portunus (Portunus) sayi (Gibbes).

One male, Pilon, Cuba, January 17, 1928; one specimen, in *Sargassum,* 10 miles south of Swan Island, Caribbean Sea, March 23, 1926.

Portunus (Achelous) gibbesii (Stimpson).

Four specimens, Guantanamo Bay, Cuba, January 17, 1928.

Portunus (Achelous) ordwayi Stimpson.

One male, Bury Island, Bahamas, January 21, 1923; one, Turtle Harbor, Fla.

Portunus (Achelous) sebae (H. Milne Edwards).

One male, Porto Padre, Cuba, March, 1928.

Portunus (Achelous) spinimanus Latreille.

Three females, Miami, Florida, January 26, 1924; two specimens, Guantanamo, Cuba, February 8, 1924; two specimens, from 7 fms., sandy bottom, Double-Headed Shot Cay, Cay Sal Bank, Bahamas, February 18, 1925.

Portunus (Achelous) spinicarpus Stimpson.

One specimen, Port Antonio, Jamaica, February 17, 1928; three specimens, taken with the dredge down 30 fms., 14 miles S. W. of Marquesas Keys, Fla., March, 1924; one specimen, from 5 fms., American Shoal Light, Fla., March 3, 1924; one male, Roncador Bank, Caribbean Sea, January, 1928.

A very rare species.

Portunus (Achelous) depressifrons Stimpson.

One male, Cardenas, Cuba. Rare.

Lupella forceps (Fabricius).

Two specimens, Guantanamo Bay, Cuba, February 4, 1924; two specimens, Port Antonio, Jamaica, February, 1926. One of these is exceptionally large and is the subject of the first color plate of the species, made by Mr. Belanske. Rare.

Goneplax tridentata A. Milne Edwards.

One male, dredged in 150 fms., 7 miles S. W. off Alligator Reef, Fla., March 30, 1926.

Very rare; this is the third record and largest specimen ever taken.

Speocarcinus carolinensis Stimpson.

One male, Nuevitas Bay, Cuba; a female, dredged in 5 fms., Catalina Creek, Cuba, February 15, 1924; three specimens, Limon Bay, Panama, February 26, 1926. A rare species.

Grapsus grapsus Linné.

Turtle Rocks, Bahamas, tide-line, one female. (See also Galapagos and Cocos Island records.)

Aratus pisonii (H. Milne Edwards).

One male, Catalina Creek, Cuba, tag 91. Abundant in the tropics, but apparently quite rare in collections.

Percnon gibbesii Milne Edwards.

One specimen from the pond, middle of Sand Key, Dry Tortugas, Nov. 27, 1923. Rare.

Cardisoma guanhumi Latreille.

One female, Miami Beach, Florida, February, 1922.

Ocypode albicans Bosc.

Two females, Dry Tortugas, Florida, November 26, 1923.

LABRADOR-NEW ENGLAND FAUNA.

Hyas coarctatus Leach.

Several specimens, dredged in 7 fms., upper end of Whitehaven Harbor, Nova Scotia, September 6, 1926.

Libinia dubia H. Milne Edwards.

Two males, Long Island Sound, Northport, N. Y., July 7, 1922; one large male from the same locality, July 7, 1928.

Cancer amaenus Herbst=*Cancer irroratus* Say.

Eight specimens from the upper end of Whitehaven Harbor, Nova Scotia, September, 1926.

Uca pugnax (S. I. Smith).

Three specimens, Northport Harbor, Long Island, N. Y., September 11, 1928.

TROPICAL AMERICAN PACIFIC FAUNA.

Stomatopoda.

Squilla panamensis variety *B*, R. P. Bigelow.

Three, Puntas Arenas, Costa Rica, March, 1928. Rare.

Brachyura.

Raninoides laevis lamarcki A. Milne Edwards and Bouvier.

A pair. Perlas Island, February 19, 1928. Very rare; first Pacific record of a species also known from a very few records in the West Indian region.

Persephona edwardsii Bell.

Two males, Saboga anchorage, Perlas Islands, March, 1928. Very rare.

Persephona orbicularis Bell.

A male and a female, Saboga anchorage, Perlas Islands, March, 1928. Exceedingly rare; only specimens known, since the type is lost.

Randallia ornata (Randall).

One young female, Punta Arenas, Costa Rica. Rare; this establishes the first Costa Rican record of the species which substantially extends its southern range.

Collodes granosus Stimpson.

Three males, two females, ovigerous, Perlas Islands, February 19, 1928. One, Punta Arenas, Costa Rica, Feb., 1928. A very rare species, hitherto known only from the Gulf of California.

Dasygius depressus Bell.

One specimen, taken inshore, Wafer Bay, Cocos Island, March 5, 1926. Rare; first record from Cocos.

Heteractea lunata (Milne Edwards and Lucas).

One ovigerous female, Punta Arenas, Costa Rica, March, 1928. Very rare. First Costa Rican record for the species.

Eriphides hispida (Stimpson).

One male, Webb Cove, Hood Island, Galapagos Islands, March, 1928; one female, Indefatigable Island, Conway Bay, Galapagos, March 11, 1926. Rare.

Portunus (Portunus) xantusi (Stimpson).

One male, one female, Perlas Islands, March, 1928; one male, one female, Punta Arenas, Costa Rica, February, 1928. Rare.

Euphylax dovii Stimpson.

One male, inshore, Wafer Bay, Cocos Island, March 5, 1926. Very rare: first Cocos record of the species.

Chasmocarcinus latipes Rathbun.

Five specimens, inshore, Wafer Bay, Cocos Island, March 30, 1926. Very rare; hitherto known only from the holotype, from Magdalena Bay, L. C. The present record substantially extends the southern range of the species, and also gives the first capture of both sexes.

Grapsus grapsus Linné.

Seven specimens, Hood Island, Galapagos, March, 1928; one male, Wafer Bay, Cocos Island, March 1928. (See also Florida record for this species.)

Uca coloradoensis (Rathbun).

One male and one female, Canos Island, Costa Rica, February 15, 1928. Rare.

MEDITERRANEAN FAUNA.

Dorippe lanatus (Linné).

Two males, one female, dredged in 35 fms., N. E. by N. of Cape Carthage, Gulf of Tunis, Mediterranean Sea, July 21, 1927. One female, dredged in 100 fms., 9½ miles E. by S., ½ S. from Cape Bon Tunis, North Africa, July 19, 1927. Rare.

Stenorynchus longirostris Fabricius.

One specimen, Adriatic Sea. Rare in American collections.

Inachus dorsettensis (Pennant), infested with *Sacculina neglecta* Fraissé.

One specimen, dredged in 325 fms., 38 miles S. E. by ½ E. of Cape Spartivento, Island of Sardinia, July 22, 1927. One specimen, dredged in 100 fms., 9½ miles E. by S., ½ S. of Cape Bon Tunis, North Africa, July 19, 1927.

Maia verrucosa H. Milne Edwards.

Two specimens, Casa Blanca, Morocco, August 20, 1924.

Pilumnus spinifer H. Milne Edwards.

One specimen, dredged in 100 fms., 9½ miles E. by S., ½ S. from Cape Bon Tunis, North Africa, January 19, 1927. Rare in American collections.

Bathynectes longipes (Risso).

One female, dredged in 19 fms., grassy bottom, 10 miles south of Cagliari, Sardinia. Rare in American collections.

Portunus (Portunus) corrugatus (Pennant).

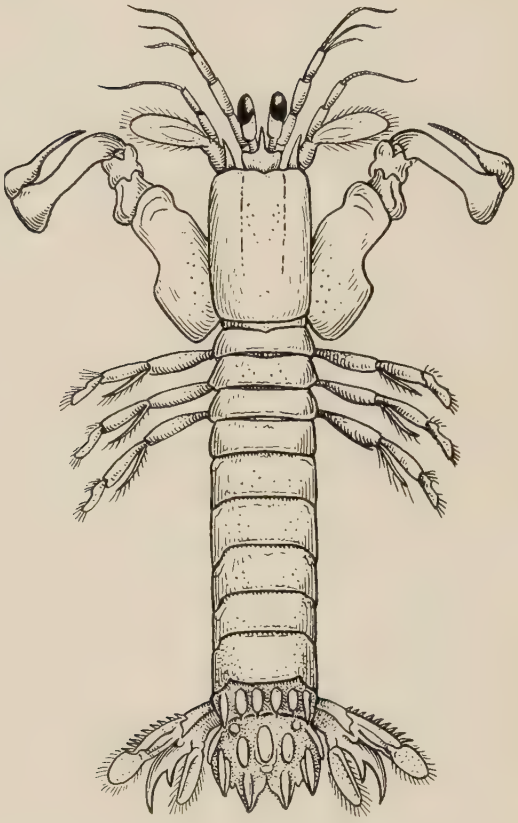
Two, dredged in 19 fms., grassy bottom, 10 miles S. of Cagliari, Sardinia, July 23, 1927.

Portunus holsatus Fabricius.

Five specimens, from 11 fms., Casa Blanca, Morocco, August 20, 1924.

Gonoplax angulata (Pennant).

One female, infested with Rhizocephalid parasite, dredged in 35 fms., 5 miles N. E. by N. of Cape Carthage, Gulf of Tunis, Mediterranean Sea, July 21, 1927.



Gonodactylus oerstedii Hansen ×1.5.

SYSTEMATIC DISCUSSION.

Order: STOMATOPODA.

Family: Squillidae.

Genus: GONODACTYLUS Latrielle.

Gonodactylus oerstedii Hansen.

Plate 1.

TYPE: Hansen simply designated this species as from the West Indies, briefly distinguishing it from the Indo-Pacific form.

DISTRIBUTION: A member of the reef fauna of the West Indian faunal region.

MATERIAL EXAMINED: Three specimens taken in dragnet, Bimini, Bahamas, November, 1924; two specimens, Florida Keys, February, 1924; one specimen, Florida Keys, March, 1924; one specimen, taken in drag-net, 2 fms., Port Antonio, Jamaica, February, 1926, by the *"Ara,"* William K. Vanderbilt, commanding.

COLOR: In life this species is a vivid grass green, with peacock blue markings on the retrochela and caudal fan.

TECHNICAL DESCRIPTION: Rostrum a subrectangular plate with the distal angles rounded and produced to a very slender, acute spine in the median line. Carapace also rectangular, smooth, except for the lateral longitudinal groove on each side. Frontal margin on each side of the rostrum and anterolateral angle evenly rounded; lateral margins subparallel, posterior margin relatively straight.

The second thoracic segment is narrow, short, with the lateral margin closely appressed, semiconcealed beneath the reflexed retrochela; the third and fourth segments are longer, subequal, with the lateral margin bluntly rounded; the fifth thoracic segment is longer but its epimeral plate is narrower, more tapered; the first three abdominal segments are subequal, except that the first segment bears at its anterior angle a flexible lobed epimeral process; the lateral margins of all three segments are bordered by a flat carina which is wider anteriorly; the fourth and fifth abdominal segments are successively longer

with their lateral margins similar to those preceding; the posterior margin relatively straight in the median line and convex on each side; the sixth segment is shorter than the others with a transverse flat carina along the anterior margin and with six large, thick, longitudinal tubercles, subequally spaced and terminating in an acute denticle posteriorly; the outermost one on each side being more acuminate than those adjacent. The telson has the proximal part elevated and ornamented with three thick elongate tubercles; there is also a small, round granule at the base and slightly outside of each of the long, outer tubercles; the distal telsonic margin is cut by a median V-shape sinus on either side of which is a triangulate, acuminate tooth with its inner lateral margin denticulate, its median dorsal surface with a heavy, node-like carina; a small, short tooth on the outer side of this large tooth at the base, and then another large tooth, its upper surface with two, prominent, thick ridges, its outer margin carinate, notched near the base forming a small tooth from which the heavy, carinate lateral margin extends back as a ridge to the base of the telson.

The uropoda are very strong, the peduncle with a small spine at the base of the outer blade; the produced inner process slightly longer than either blade of the telson, the outer angle produced into a longer, sabre-like tooth, which is separated from the similar but shorter acuminate tooth of the inner angle by a deep, V-shape sinus. The outer blade is thick, irregularly shaped, with a rounded node at the base of its inner lateral margin, an oblique ridge on its upper surface and with eleven strong, acuminate, movable spines of unequal length along its outer lateral margin, and one double spine at its outer distal angle; the distal article of the outer blade is very small, oval, nearly subcircular, ciliate; the smaller inner blade is narrow, long, both lateral margins convex but unequal to each other, distal margin rounded; a strong, oblique, longitudinal carina near the outer lateral margin; entire margin ciliated.

The eyestalk is very short, cylindrical, the cornea dorso-terminal, convex, about as long as the stalk and of approximately the same width; composed of very fine facets.

The antennulae have the peduncular joints slender, clavate, approximately subequal, the three together being twice as long as the eye; the flagellum is short, stocky, the upper whip being one and one-half times as long as the third peduncular article; the lower flagellum is two-branched, its upper branch being one and two-thirds times as

long as the upper flagellum, while the lower whip is about equal to the upper flagellum.

The outer antennae have the basal peduncular article thick, knobbed, with an acuminate tooth at the inner distal angle; the scaphocerite is narrow, elongate-ovate, with ciliated margins; the second and third peduncular articles are slender, clavate, the flagellum is composed of 28 articles and extends about as far forward as that of the inner antennae.

The first maxillipeds are slender, thin, leg-like, terminating in a small, unequal-sided, ovate article that bears a thick brush of bristly setae on its outer and distal margin.

The second maxillipeds form the great retrochela; the merus is greatly elongated, with its upper surface smooth, convex, its superior lateral and posterior margins rounded, the distal two-thirds of the lower lateral margin excavate for the reception of the reflexed propodus; the carpus is short, smooth, convex; the propodus is two-thirds as long as the merus, with the proximal three-fourths slightly narrower than the distal end, which is rounded externally; the lower lateral margin of the propodus is grooved for the reception of the dactyl; the dactyl is thickened, externally convex for the proximal third of its length, then forms a slender, rod-like blade with the tip very curved; the cutting edge is very finely denticulate.

The third maxillipeds and first and second thoracic legs are similar, subequal, each with a sublobate exopod at its base; the ischium is greatly elongated, slender, arched, the merus is short, outwardly thick, its inner lateral margin produced into a laminate, convex lobe; the carpus is small, wider distally, its outer lateral margin bristly, it and the propodus reflexed upon the laminate process of the merus; the propodus is laminate, roughly suboval, the outer margin more convex, the inner margin with its proximal angle bluntly rounded, its margin thickly set with bristles; the dactyl is slender, curved and folds upon the lateral margin of the propodus.

The third, fourth and fifth thoracic legs are weak and fragile, each with an epipodite; the distal joint is set along its outer, rounded margin with 8 to 12 articulated spines of unequal length and there are several more of these at the distal end of the preceding article.

Five pairs of strong, biramous pleopoda arise from the respective abdominal segments.

SYNONYMY: *Squilla chiragra* FABRICIUS (part), Ent. Syst., vol. II, p. 513, 1793; Suppl. p. 417, 1798.—HERBST, Naturg. Krabben u. Krebse, vol. II, p. 100, pl. 24, fig. 2, 1796 (part).—DESMAREST, (part), Consid. Gen. Crust., p. 251, pl. 43, 1825.

Gonodactylus chiragra (part), LATREILLE, Encyc. Meth., vol. X, p. 473, 1825.—Atlas, pl. 125, fig. 2.—H. MILNE EDWARDS (part), Hist. Nat. Crust., vol. II, p. 528, 1837.—GIBBES, Proc. Amer. Assoc. Adv. Sci., p. 201, 1850.—DANA (part), U. S. Explor. Exped. Crust., vol. 13, p. 623, pl. 41, fig. 5, 1852.—S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. II, p. 41, 1869.—MIERS (part), Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 118, 1880.—W. K. BROOKS, Johns Hopkins Univ. Circ., vol. II, p. 71, 1892 (life history); Mem. Nat. Acad. Sci., vol. 5, pp. 353-360, pl. I, fig. 2, Pl. III, colored figure of adult; pls. XIV, XV, larvae, 1897.—BIGELOW, R. P., Proc. U. S. Nat. Mus., vol. XVII, p. 545, 1894.

Gonodactylus oerstedii HANSEN, Cumaceen und Stomatopoden der Plankton Exped., p. 65, 1895.—RANKIN, Ann. N. Y. Acad. Sci., vol. XI, p. 253, 1898; *op. cit.*, vol. XII, p. 545.—BIGELOW, R. P., Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 152, figs. 1, 2, 1901.—VERRILL, A. E., Trans. Conn. Acad. Arts and Sci., vol. 26, p. 189, fig. 1, 1922.—RATHBUN, Rapport betreffende een voorloopig onderzoek naar den toestand de Visscherij en de Industrie van Zeeproducten in de Kolonie Curacao, 1907, p. 348.—SCHMITT, Bijdragen tot de dierkunde uitgegeven, natura artis magistra te Amsterdam, 23E afl., 1924, p. 80.

Gonodactylus gonagra variety *oerstedii* BORRADAILE, On the Stomatopoda and Macrura brought by DR. WILLEY from the South Seas, Zoological Results, part IV, p. 402, 1900.

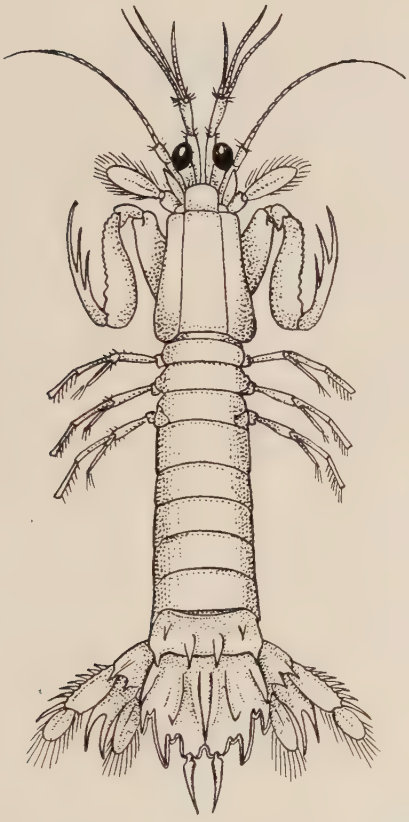
Genus: **PSEUDOSQUILLA** Guerin.

Pseudosquilla ciliata Fabricius variety **occidentalis** Borradaile.

Plate 2.

TYPE: Borradaile designated the variety "*occidentalis*" on several specimens from the West Indian region.

DISTRIBUTION: A reef-dweller of the West Indian faunal region;



Pseudosquilla ciliata Fabricius variety *occidentalis* Borradaile, natural size.

closely allied to the typical *P. ciliata* Fabricius, which is known from the Indo-Pacific region, Philippines, Hawaii, Fiji Islands, Loyalty Islands, New Britain, Australia and a few other localities in Oceania.

MATERIAL EXAMINED: Five specimens from the Florida Keys, March, 1924; five specimens dredged in 30 fms., southwest of the Marquesas Keys, Florida, March 2, 1924.

HABITS: This species is abundant in the rock crevices of the West Indian coral reefs, and while it is chiefly nocturnal, swimming about and procuring its food at night, it is also occasionally found swimming during the day, its powerful caudal fan and abdominal appendages enabling it to propel itself rapidly and gracefully.

COLOR: The coloration of this species, resembling *G. oerstedii,* is very variable. The males are usually bright grass green with a cast of peacock blue, especially on the retrochela and caudal fan; the appendages are margined and tipped with carmine. The females are less vividly colored, as are also the young males, both of which forms frequently appear olivaceous with marblings of yellowish or brownish.

TECHNICAL DESCRIPTION: Rostrum wider than long, produced to a slight median point, with the fronto-lateral margins evenly convex; the carapace is convex, smooth, except for the longitudinal lateral groove on each side, frontal margin much less excavate than that of *G. oerstedii;* anterolateral margins rounded but scarcely at all produced; posterolateral margins also rounded; posterior margin relatively straight. The visible thoracic and first five abdominal segments are smooth. The third abdominal segment is very short and narrower than the others, its epimeral margin rounded; the fourth, fifth and sixth abdominal segments are approximately equal with the lateral margins rounded, but slightly different; the fourth being quite blunt and broad, the fifth more convex, and the sixth more tapered, subacute. The first, second, third and fourth abdominal segments are subequal in length and all have the lateral margins truncated, the first segment having a rounded, flap-life process anteriorly. The fourth segment is said by Borradaile to have no tooth at its postlateral angle, but of the eight specimens before me from southern Florida, only one has no spine at this angle and it is a small young specimen; one specimen has a spine at this angle on the right side but none on the left, this is also a small specimen; the other six specimens ranging from small to large have a small, short, acute spine at the postlateral angle

of the fourth abdominal segment, as in the Indo-Pacific form. The fifth abdominal segment is one and one-fourth times as long as the fourth and has an acute tooth at its postlateral angle; the sixth segment is one-half as long as the fifth, and is ornamented with a submedian pair of acute, conical spines that form an elevation on the surface of the segment and project beyond it for a distance equal to half its length; a second pair of smaller, acute spines occur, one on each side about halfway between the submedian and lateral margin and about midway the length of the segment, not projecting beyond its posterior margin. At the postlateral angle there is also an acute conical spine which projects beyond the telson, between its margin and the peduncle of the uropod.

The telson is shield-shaped, sharply elevated in the median line into a strong, laterally compressed keel which terminates subdistally in a spine and has near it on either side a shorter, lower carina, outside of which there is a second low carina, divergent and a trifle longer than the inner one and terminating in a blunt tooth. Outside of this carina the telson is depressed; there is a small, blunt node or tooth proximally just inside the heavy carina which margins the lateral border of the telson. There are a submedian pair of slender, acuminate, articulated spines on the distal margin of the telson, with a rounded, ridge-like elevation of the telson behind the base of each of these spines, which are separated from each other by two small, rounded nodes; outside the submedian spine the margin is excavate, a low, broad, rounded node, followed on its outer side by an acute spinule, then a long, acuminate, conical spine separated on its outer margin by an excavation and a small spinule from another long, acute conical spine, the outer margin of which is confluent with the lateral margin of the telson.

The uropoda have a strong peduncle that is marked on its upper proximal surface by a carina terminating distally in an acute spine with its tip incurved above the outer blade; the produced part of the peduncle is slightly longer than the basal section of the outer blade and is forked distally, the outer angle terminating in a triangulate scale which is only two-thirds as long as the similar spine which terminates the inner angle; both of these spines are decidedly curved inward; the inner blade of the uropod is long, narrow, oval, ciliate, with a median groove proximally. The outer blade has the proximal article as long as the inner blade, thickened with an approximately median ridge, armed with nine acuminate, curved spines of succes-

sively increasing size, along the outer lateral margin, the ninth spine being twice as long as the previous one, and situated on the outer distal margin of the article; each spine is ciliate along its inner lateral margin. The distal article of the outer blade is two-thirds as long as the proximal article, oval, cilated.

The eyestalk is short, cylindrical, the cornea spherical, of about the same diameter as the stalk, set obliquely terminal upon it.

The antennulae are short, the three peduncular articles clavate, subequal; the upper flagellum slender, composed of 42 cilated rings; the shorter branch of the lower flagellum consists of 24 rings, while the longer branch is subequal to the upper flagellum.

The antennae have the peduncular article short, a tooth at its outer distal angle, its upper margin rounded; the acicule extending nearly half its length beyond the first joint, flat on the dorsal surface, its lateral margins keeled, convergent distally, the tip down-curved, acute. The scaphocerite is three and one-half times as long as wide, oval, its distal and inner lateral margins fringed with plumose setae; it is about twice as long as the eye. The second and third peduncular articles are clavate, subequal, extending slightly beyond the eye; the flagellum is slender, consisting of 36 rings.

The first maxillipeds are slender, leg-like, the propodus suboval, laminate, with a dense brush of setae on its distal and upper lateral margins, the dactyl is very small, curved, acute-tipped, fitting across the curved distal border of the propodus.

The second maxillipeds form the retrochela, the ischium is elongate and excavate on its inferior lateral margin; the merus is about as long as the carapace, its upper margin convex medially and slightly excavate distally; the lower margin excavate for the reception of the reflexed propodus; the carpus is very small, convex, wider distally and fits into the grooved under side of the merus; the propodus is long, narrow and rather compressed, thin, the outer margin rounded distally and with one subdistal tooth; the opposite margin is set with a row of saw-tooth like denticles; there are three long, acute, articulated spines proximally, on the inner margin, also three cavities into which the teeth of the dactyl fit; the dactyl is slender, very curved distally with one rapier-like distal tooth and two slenderer, curved, acute, unequal teeth arising from the inner margin.

The third maxillipeds and first and second thoracic legs are similar, successively decreasing in size posteriorly; the merus is arched, elong-

ate, dorsoventrally flattened with a rounded laminate process at the inner distal angle; the carpus is small, wider distally, the propodus is broad, thick, suboval, with its inner margin thick-set with bristles; the dactyl is slender, curved, closing upon the propodus, claw-like. The inner lateral margins of the merus and carpus are also fringed with bristles; there is a dense short brush of bristles on the outer distal margin of the propodus of the second thoracic leg.

The third, fourth and fifth thoracic legs are short, seick-like, each with a slender exopodite which is subequal in length to the joint beside which it lies; the terminal joint is fringed with stiff bristles on its outer and distal margins.

There are five pairs of abdominal pleopoda, each biramose, very powerfully developed; a small hook arises from the inner lateral margin of the inner blade, enabling the two blades to fasten as one, thus increasing the power as a swimming organ.

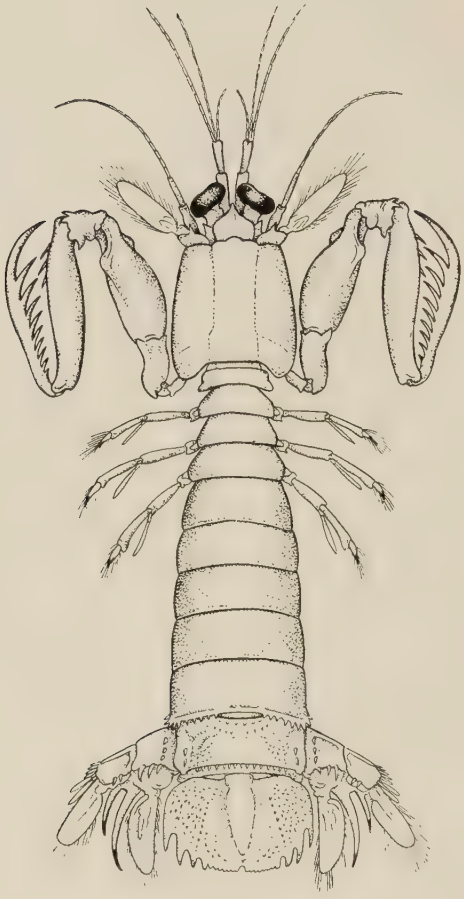
SYNONYMY: *Squilla ciliata* FABRICIUS, Ent. Syst., vol. 3, p. 512, 1793.

Squilla stylifera LAMARCK, Anim. sans Vert., vol. 5, p. 189, 1818.—LATREILLE, Encyc. Méth., vol. 10, p. 472, 1825.—GUÉRIN, Icon. Crust., pl. 24, fig. 1.—H. MILNE EDWARDS, Hist. Nat. Crust., vol. 2, p. 526, 1837.

Pseudosquilla stylifera DANA, U. S. Explor. Exped., Crust., p. 622, pl. 41, fig. 4, 1852.—VON MARTENS, Arch. fur Naturg., vol. 38, p. 146, 1872.

Pseudosquilla ciliata MIERS, Ann. Mag. Nat. Hist., ser. 5, vol. 5, p. 108, pl. 3, figs. 7 and 8, 1880.—BROOKS, Voyage of Challenger, Zool., vol. 16, art. 2, p. 53, pl. 15, fig. 10, 1886.—BIGELOW, R. P., Proc. U. S. Nat. Mus., vol. 17, p. 499, 1894; Rept. U. S. Fish. Comm., vol. 20, pt. 2, p. 154, figs. 3, 4, 1901.—RANKIN, Ann. N. Y. Acad. Sci., vol. 11, p. 545, 1900.—BOONE, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 6, 1927.

Pseudosquilla ciliata variety *occidentalis* BORRADAILE, in WILLEY'S Zool. Results from New Britain, New Guinea, etc., 1895-97.—VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 26, p. 192, pl. 50, figs. 1 and 2, pl. 51, figs. 1-1b, pl. 54, fig. 2, 1923.—RATHBUN, Rapport betrefende een voorloopig onderzoek naar den toestand van de Visscherij en de industrie van Zeeproducten in de Kolonie Curacao, uitgebracht door Prof. DR. J. BOEKE, pt. 2, 1920, p. 347. —SCHMITT, Bijdragen tot de dierkunde, Natura Artis Magistra te Amsterdam, 23 E Afl., 1924, p. 81.



Lysiosquilla maculata (Fabricius), one-half of natural size.

Genus: **LYSIOSQUILLA** Dana.

Lysiosquilla maculata (Fabricius).

Plate 3.

TYPE: Fabricius' type came from the East Indies and was deposited in the British Museum.

MATERIAL EXAMINED: One large specimen from the Florida Keys, March, 1924, taken by the *"Ara."*

DISTRIBUTION: Circumtropic, abundantly recorded from the Indo-Pacific and less abundantly known from the West Indian region. Littoral zone, burrowing.

COLOR: Alternately banded transversely with broad bands of greyish black and cream color.

TECHNICAL DESCRIPTION: Rostrum widely heart-shaped, one-fourth wider than its greatest length, produced to a median point, with the anterolateral margins rounded. Carapace squarish, with the anterolateral margins slightly rounded, posterolateral margins slightly produced, convex, median posterior margin concave; dorsal surface smooth except for the two longitudinal submedian grooves. The first and second thoracic segments are almost entirely concealed; the third segment is shorter and narrower than those following and has its lateral part inconspicuous, appressed to the body; the third, fourth and fifth segments are of equal length but successively increase in width; each segment has the lateral margin convex, anteriorly truncate, nearly right-angled posteriorly on the fourth and fifth segments, the sixth being rounded. The first four abdominal segments are subequal in length with the lateral margins slightly sinuate; the fifth segment is similar to the fourth, but a little longer and has its posterior margin armed with about twelve spinules on each side, the outer ones being the longer; the sixth segment is only four-fifths as long as the fifth with a distinct, flat, transverse carina across the anterior margin, accentuated on each side but not in the median region by a depression, and with its posterior edge spinulose; the entire posterior margin of the sixth segment is also spinulose, its lateral margin truncated. The telson is wider than long; a spinulose carina across its proximal margin, prominent, elevated, smooth, tongue-like process, which narrows posteriorly, rounded, and terminates subdistally. On either side of this elevation there is a roughened, granulose area, coarsely pitted; while the outer third of the telson bears an ovate con-

tour, outlined on its inner side by a slight elevation, the remainder being roughened, pitted and granular. There are four blunt teeth separated by concave sinuses on each side of the postlateral margin, the tooth most lateral in position and one adjacent to it being the largest, while the submedian tooth is the smallest and very blunt; the distal margin is rather bluntly truncated and bearing slight indication of about twelve rounded granulae, the slight median incision being the only definite break in the margin.

The uropoda have a very stout peduncle with one spinule at the inner angle of the outer blade; the produced under portion of the peduncle consists of an acute, curved, blade-like outer spine which extends as far forward as the distal margin of the proximal joint of the outer blade; the inner spine of this process is twice as long as the outer, from which it is separated by a U-shaped sinus; the outer spine is three-sided, its under face grooved, its tip curved upward and extending three-fourths the length of the inner blade. The inner blade is unequally elongate-ovate, its outer margin being more convex than the inner, and reaches as far posteriorly as the telson does; the outer blade has the basal joint smaller than the peduncle with a large, flat, rounded node on its upper inner margin; its outer distal margin armed with eight articulated spines of increasing size on its outer and distal margins; there is one acute, subdistal spine on its ventral surface; the distal article of the outer blade is oval, twice as wide as long, extending as far as the inner blade, with a heavy submedian carina proximally; both blades are heavily ciliated.

The eyes are large, reniform, set obliquely on short, thick stalks, the long diameter of the cornea exceeding the length of the stalk; the cornea is distinctly constricted medially and composed of very small facets.

The antennulae have the three peduncular joints clavate, subequal, the upper branch of the flagellum the longest, consisting of about fifty slender rings; the longer whip of the lower branch consists of about 45 rings, the shorter, of about 35 rings.

The antennae have the peduncular article large, its inner distal angle with a triangulate tooth; the acicule represented by a narrow, elongate, triangulate process of soft, semitransparent membrane; the second and third articles are slender, clavate, the third slightly longer than the second; the scaphocerite is three-fifths as long as the carapace, oval, ciliate; the flagellum is somewhat thicker and not quite as long as the longest whip of the antennulae.

The first maxillipeds are slender, the distal articles are unfortunately broken in the present specimen.

The retrochela is large, the ischium with a reinforced distal joint, the merus elongated, about as long as the carapace, convex outwardly with a cup-like excavation on its upper distal border; the inferior margin carinate and excavate beneath; the carpus is small, with a subdistal tooth on its outer margin; the propodus is one and one-third times longer than the merus, flattened, convex distally on the outer margin; the inner margin more convex proximally; its outer edge banded with fine denticulations; the inner edge with four articulated spines proximally; the dactyl is as long as the propodus, very curved apically, slender, with eight curved acuminate teeth on its inner side and with the ninth, or apical tooth very strong, all fitting into the sheath-like apertures of the propodus.

The third maxillipeds and first and second thoracic legs are similar, the proximal four joints slender; the propodus subovate, laminate, nearly subcircular, its anterior margin ciliate; the dactyl is slender, curved, acuminate, folding across this ciliate margin, claw-like.

The fourth, fifth and sixth thoracic legs are weak, stick-like, each with an epipod as long as the related article; the distal article bears a heavy brush of setae.

The pleopoda are heavy, well developed.

As pointed out by Miers, the principal distinguishing character between *L. maculata* and *L. glabruiscula* was long believed to be the different dentition of the retrochela, the Indo-Pacific form having nine or ten, the West Indian *L. glabruiscula* having from five to seven teeth or spines. The large West Indian specimen taken by the *"Ara"* has ten teeth on the retrochela, while younger West Indian specimens I have examined have only five to eight. Hence it becomes necessary to unite the two species under the older name, *L. maculata.*

Synonymy: *Squilla arenaria* Rumphus, Amboin. Rarit., p. 6, pl. 3, fig. E, 1705.

Squilla maculata Fabricius, Ent. Syst., vol. 2, p. 511, 1793; Suppl., p. 415, 1798.—Lamarck, Hist. Anim. sans Vert., vol. V, p. 188, 1818.—Desmarest, Consid. Crust., p. 250, 1825.—Latreille, Méth. Hist. Nat., vol. X, p. 470, 1825.—H. Milne Edwards, Hist. Nat. Crust., vol. 2, p. 518, pl. 26, fig. 11, 1837.—DeHaan, Fauna Japon. Crust., p. 221, 1849.—White, List Crust. Brit. Museum, p. 83, 1847.

Cancer (Mantis) arenarius Herbst, Nat. Krabben u. Krebse, vol. 2, p. 96, pl. 33, fig. 2, 1796.

Lysiosquilla maculata Miers, Proc. Zoöl. Soc. London, 1877, p. 138; Philosoph. Trans. Royal Soc., vol. CLXVIII, p. 494, 1879; Ann. Mag. Nat. Hist., series 6, vol. 6, 1880, p. 5.

?Squilla glabriuscula Lamarck, op. cit. vol. V, p. 188, 1818.—Latreille, op. cit. vol. X, p. 470, 1825.—H. Milne Edwards, op. cit. vol. 2, p. 519.

Squilla vittata H. Milne Edwards, op. cit. vol. 2, p. 519.—White, op. cit. p. 83.—Gibbes, Proc. Amer. Assoc. Adv. Sci., 1850, p. 199.

Lysiosquilla glabriuscula Miers, Ann. Mag. Nat. Hist., series 6, vol. 6, p. 7, 1880.

Genus: **SQUILLA** Fabricius.

Squilla mantis Latreille.

Plate 4.

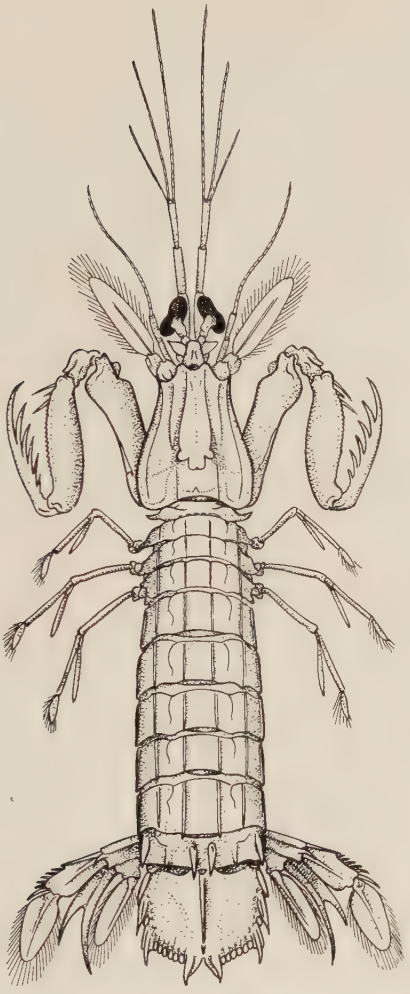
Type: Latreille states that according to Risso this species is found in the deeper waters of the Mediterranean and according to Linnaeus in the seas of the North (Europe). It is now generally accepted that Linnaeus confused several species.

Distribution: Mediterranean Sea and found less abundantly on the Atlantic shores of the Hispanic peninsula and as far north as southern England.

Material examined: One specimen taken at Porto Padre, Cuba, March, 1928, by the *"Ara."*

Color: Never described.

Technical description: This species is superficially quite similar to *S. alba.* The rostrum is longer than wide, shaped like that of *alba,* but *mantis* has the median longitudinal carina broken posteriorly and bifurcated, forming an elliptical contour which unites near the posterior margin. There are two carinae on each side the median carina, one of these is just below the lateral groove and is interrupted posteriorly by a transverse sulcus; the other lateral carina is about halfway between the upper lateral carina and the extreme lateral margin, which is also carinate. The third thoracic segment terminates its anterior margin on the ventral surface in an acute, downward pointed



Squilla mantis Latreille, four-fifths of natural size.

spine; the epimeral angle is also an acute tooth directed down and posteriorly. The remaining thoracic segments resemble those of *alba* and so do the abdominal segments, the only differences being that the tooth at the postlateral angle of each segment of *mantis* is longer and sharper than are those of *alba,* and that all the carinae of the fifth segment of *mantis* each terminate in a small spine, as do also those of the sixth segment. There is a median longitudinal carina extending from the third thoracic segment to the posterior margin of the abdominal segment. The telson has the same general shape and proportions as that of *alba,* but the marginal dentition differs, *mantis* having the median ridge terminating posteriorly in a spine beneath which there is a nodular granule at the base of the slit-like median incision, on either side of which there are four small, rounded teeth, those from the center being the largest and adjacent to a sharp, longer, pointed tooth, which is followed on the outerside by five acute, triangulate teeth, beyond which there is one long, acuminate tooth with a median keel extending back a short distance on the telson, and which is separated on the outside by a short, triangulate tooth from a long acuminate tooth with a median keel running back onto the telson; about opposite the proximal termination of this keel there is on the lateral margin a blunt tooth, which is continuous with the lateral carina of the telson.

The peduncle of the uropod is similar to that of *alba* and has a spine at its rostral margin; the proximal half of the outer blade differs in having seven acute movable spines, successively increasing in length from the proximal to the distal, along the distal half of its outer margin; the distal half of the outer blade is oval, ciliate; the inner blade is small, elongate, with a rounded apex. The produced inner angle of the peduncle has the same general shape as that of *alba,* with the inner lateral margin carinate and the inner distal angle produced into a curved, elongate, acuminate tooth whose apex is in line with that of the innermost long spine of the telson; the rounded node lying between this spine and the one forming the outer distal angle is decidedly smaller than that of *alba;* the outer distal angle of *mantis* is a long, acuminate tooth.

The eyestalk is very short, stocky; the cornea is very large, reniform, set obliquely upon the stalk, the long diameter of the cornea twice its own short diameter, and about twice the length of the stalk.

The inner antennae are similar to those of *alba.*

The external antennae differs from *alba* in the shape of the proximal

joint of the peduncle, which is narrowed distally and has its outer lateral margin oblique, while that of *alba* is squarish.

The first maxillipeds are slender with a weak subchela, formed by the laminate, oval, pedunculate article which is furnished with a brush of setae along its anterior margin; the terminal segment is a slender curved claw, fitting upon the preceding article and forming a chela.

The second maxillipeds form a large retrochela which folds along the lateral margin of the carapace and forms a sort of sidewall when closed. The merus is elongate with its lower lateral margin carinate and its upper lateral margin with a deep concavity distally in which there is a nodular tubercle; the carpus is small and is curiously jointed to the propodus and is short, rounded; the propodus is as long as the merus upon which it is reflexed and has its outer surface smooth, its inferior margin armed with a continuous row of small denticles and with five sheath-like pockets on its inferior margin for the reception of the claws of the dactyl; there are three slender, acuminate, articulated spines on the inner lower proximal margin of the propodus. The dactyl is slender with a curved apex and armed with four slender curved teeth on its inner margin, which fit into the glove-finger-like apertures on the margin of the propodus.

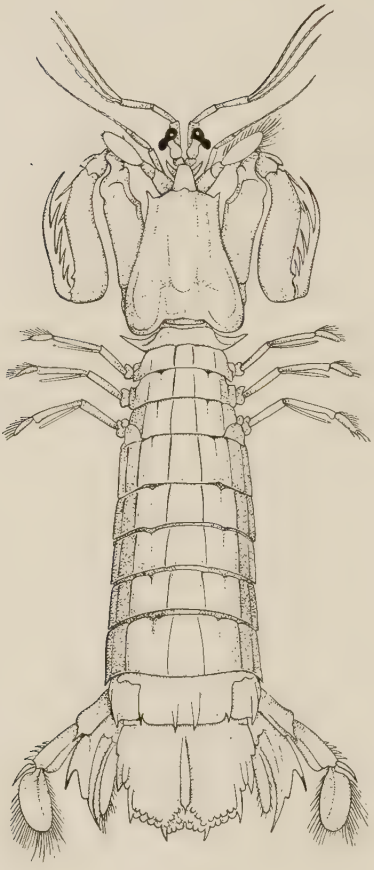
The third maxillipeds and second and third thoracic legs are similar and subequal; weakly chelate; the propodus laminate, widely oval, with a fringe of bristly setae along its lateral margin; the dactyl is slender, curved, acuminate, folding upon the anterior lateral margin of the propodus.

The third, fourth and fifth thoracic legs are slender, stick-like, four-jointed, each with a cane-like epipod.

The abdominal pleopoda are very powerful.

SYNONYMY: *Squille mantis* DEGEER, Mem. pour servir a l'hist. des Insectes, vol. VII, p. 533, 1778.

Squilla mantis LATREILLE, Hist. Nat. Crust., vol. 6, p. 278, pl. lv, fig. 1, 1802; Encycl. Méth. Hist. Nat., vol. X, p. 471, 1825; Atlas, pl. ccxcv, figs. 1, 7, and pl. ccxxiv; CUVIER, Règne Anim., vol. 4, p. 108, 1829; LAMARCK, Hist. Anim. sans Vert. vol. v, p. 187, 1818; RISSO, Hist. Nat. Europ. Merid., p. 5, 1826; H. MILNE EDWARDS, Hist. Nat. Crust., vol. 2, p. 520, 1837; Crust. in CUVIER, R. A., ed. 3, Atlas, pl. LV, fig. 1; WHITE, List Crust. Brit. Mus., p. 83, 1847.—LUCAS, Anim. Artic. in Expl. Algérie, vol. 1, p. 50,



Squilla alba R. P. Bigelow, natural size.

1849.—Bell, Brit. Crust., p. 351, 1851.—Johnson, Ann. and Mag. Nat. Hist., vol. 3, p. 56, 1859.—Heller, Crust. Sudl. Europa, p. 306, pl. X, figs. 15-19, 1863.—B. Capello, J. Acad. Sci. Lisbon, p. 80, 1877.—Miers. Ann. and Mag. Nat. Hist. (5), vol. 5, p. 21, 1880.—Bigelow, R. P., Proc. U. S. Nat. Mus., vol. 17, p. 526, 1894.

Latreille states that this crustacean was used by the ancients as a medicine.

Squilla alba R. P. Bigelow.

Plate 5.

Type: Taken at Bimini Harbor, Bahamas, burrowing in calcerous sand, and deposited in the United States National Museum.

Distribution: Known only from the type-material and the *"Ara"* specimens, which establishes the first Cuban and Panama record for the species.

Material examined: One specimen, dredged in Limon Bay, Panama, February 26, 1926, by the *"Ara."* One specimen from Nuevitas Bay, Cuba, February 26, 1923.

Color: Dr. Bigelow, who personally collected the type specimen, reports that it is opaque white with a few symmetrically placed black spots; the eyes are yellowish.

Technical description: Rostrum longer than wide, 4 mm. long, 2.8 mm. wide, basally with the lateral margin slightly convergent, the distal margin rounded. The carapace is narrowed anteriorly, the frontal margin on either side of the rostrum slopes to the anterolateral angle, which is armed with a small, acute, forward and slightly outward pointing tooth; the lateral margins are carinate and diverge posteriorly, the posterolateral lobes being rounded, the posterior margin slightly emarginate in the median region. There is a median longitudinal carina which does not extend to the rostrum, on either side. There is also an incomplete longitudinal carina on each side near the lateral margin. The median lateral longitudinal grooves are sharply defined.

The exposed thoracic and abdominal segments are transversely convex, the first and second short, with the lateral parts concealed; the third segment has the lateral margins produced to an acute, outward,

Seattle, Washington.

forward and slightly downward pointing tooth which has the postlateral margin carinate and on the ventral surface there is an acute, down-pointed spine on each side. The fourth, fifth and sixth segments are successively longer and wider, the lateral margins of the fourth and fifth segments are oblique with a broad, rounded process at the postlateral angle; the sixth or longest segment has a rounded node or tooth at the anterolateral angle and the posterolateral margin is excavate and concealed beneath an ovate movable process which is attached laterally to the anterior margin of the first abdominal segment. The first five abdominal segments are subequal and similar, except that the fifth segment is about one-eighth longer than those preceding and has a short, acute tooth at its postlateral angle; on one of the specimens the longitudinal carinae of the fifth segment each terminate posteriorly in an acute tooth as on the sixth segment. The sixth or pretelsonic segment is about half as long in the median line as the preceding segment with a short, acute, curved, downward and outward pointing tooth at the anterolateral angle; the lateral margin slanting obliquely inward to the edge of the telson and armed with another smaller, acute tooth at the postlateral angle. In addition to the carinate margins there are six longitudinal carinae, the submedian and adjacent median lateral pair of which begin on the anterior part of the fourth thoracic segment and extend, approximately parallel to each other to the posterior margin of the sixth abdominal segment, while the lower lateral pair begin on the anterior part of the first abdominal segment; all six carinae terminate posteriorly in an acute spinule or tooth on, or almost on, the posterior margin of the pretelsonic segment. The telson is shield-shaped with a prominent median longitudinal, nodulose ridge which terminates subdistally in a small acute spine pointed posteriorly and has just behind and below it a conical tooth, below which the telson is depressed. There is a narrow, slit-like sinus in the median line of the posterior margin and on either side of it the margin is rounded into a broad tooth, above which there is a single nodular denticle and which is followed on the margin by a smaller rounded tooth which is immediately adjacent to a longer, pointed, spinose tooth from the base of which there extends inward towards the median ridge a curved row of four rounded tubercles on each side. There are four rounded teeth of unequal sizes each with a rounded nodular tubercle at its base, between this submedian spinose tooth and the next acute spinose tooth which has a short granulose carina running in from its base for a short distance, and which is separated

at its outer side by a single rounded tooth with a basal node from another acute, spinose tooth which also has a prominent carina running in from its base for a short distance; outside this spinose tooth on the lateral margin there is midway a single blunt tooth which is the terminus of a decided carina that extends along the lateral margin to its base. The dorsal surface of the carapace is microscopically granulate and punctate. The uropoda have the peduncle with two longitudinal carinae on the proximal part and with an acute spine distally at the base of the outer blade. The inner distal angle of the peduncle is produced into a large blade which is a trifle longer than the inner blade of the uropod and which is produced at its inner distal angle to an attenuated, acuminate spine whose apex is directed posteriorly and slightly inward towards the center and has a carinate longitudinal ridge and is followed on the outer side by an unequal-sided rounded lobe which is slightly longer and broader than the inner blade of the uropod and which has its proximal outer lateral margin excavate and separated by a slit-like incision from the long, acute spine which terminates the outer lateral angle and which has its apex about as long as the adjacent, inner rounded lobe. The inner branch of the uropod is small, narrow, elongate, narrowed proximally on the outer side and with the distal margin evenly rounded and the entire margin heavily fringed with close-set, plumose setae. The outer blade of the uropoda consists of three articles, the proximal of which is strong, with a heavy median ridge, its inner lateral margin convex and fringed with setae and its outer distal angle with a long, acute, movable spine, and with four acute, movable spines on the outer lateral margin closely appressed to each other; the distal article is about as long as the proximal and is irregularly ovate, with a pronounced, approximately median longitudinal ridge which has a parallel groove on its inner side. The entire margin is heavily fringed with plumose setae. Beside the distal article on its outer side at the base is a long, slender, sabre-blade shaped spine, not quite half as long as the oval blade beside which its concave inner margin rests.

The eyes are large, the cornea reniform, slightly constricted medially and the stalk is short, bulbous, definitely constricted below the cornea which is set obliquely upon the stalk.

The inner antennae have the three peduncular articles cylindrical, approximately subequal in length but of increasing slenderness distally; the flagellum is triarticulate, the upper branch being about one-third longer than the longer whip of the lower, two-branched flagel-

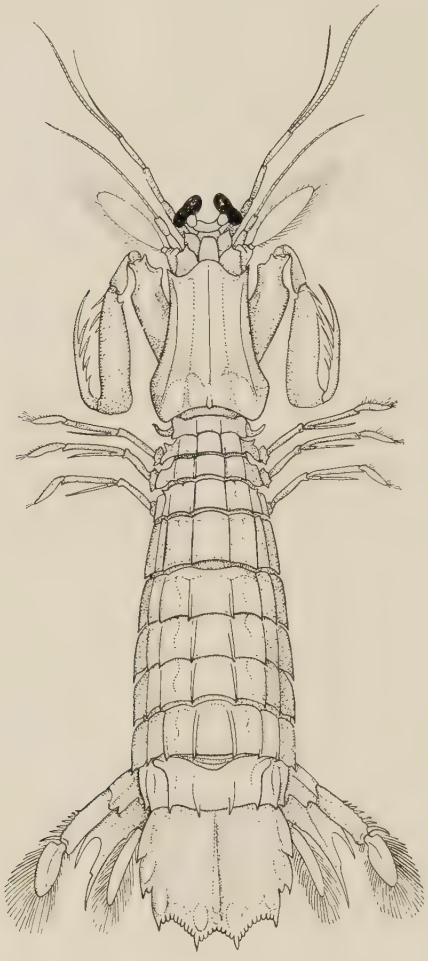
lum, and is about as long as the entire peduncle; the lower branch has its upper whip about half as long as the upper flagellum. There are no setae on the whips.

The external antennae have the basal article flattish, squarish, the second article also flattish, somewhat longer and supporting the elongate ovate scaphocerite which is a third longer than the two preceding articles considered together, and is very heavily fringed with plumose cilia; the inner distal angle of the second peduncular article also supports the flagellum, which consists of two slender, clavate articles, the proximal of which extends to midway the cornea and the second article is almost as long; the multiarticulate whip is composed of about 53 rings and extends somewhat beyond the inner antennular flagellum.

The first maxillipeds are slender, small, terminating in a weakly subchelate, ovate process, the finger being very weak and closing upon the subcircular, laminate propodus, which is very heavily set with plumose setae along its convex outer margin.

The second maxillipeds are enormously developed, forming the large retrochela which has its merus strong, fitting in beside the lateral margins of the carapace and extending beyond it as far as the base of the scaphocerite; the upper lateral distal margin of the merus has a cup-like excavation; the carpus is short, convex, with its lower lateral margin carinate, terminated subdistally in a tooth; the propodus is as long as the merus and lies reflexed upon the excavate outer lower side of the merus; the lower outer margin of the propodus is set with a continuous row of small, acute denticle-like spines beneath which marginal lamina the lateral edge of the propodus has six excavations into which the six spines of the dactyl fit like fingers into a glove; there are three acute, conical movable spines on the proximal inner lateral margin of the propodus; the dactyl is strong, slender, its tip very curved, long, acuminate, and with five acute, curved, spine-like teeth besides the apical one, arising from its inner lateral margin and fitting into the propodal as the blade of a knife fits into its sheath.

The third maxillipeds and first and second thoracic legs are similar and subequal with the basis slender, the ischium elongated slender, the merus similar but not quite so long, the carpus short, its outer-lateral surface convex, setose and armed distally with three very long movable spines; the propodus is laminate, roughly suboval, its outer margin boardly rounded, its inner, irregularly nodular, armed with three or four very long, acute movable spines and with a heavy brush



Squilla panamensis, variety *B*, R. P. Bigelow, natural size.

of setae; the dactyl is very slender, curved, closing upon the margin of the propodus, claw-like and armed with stiff setae along its outer lateral margin. The second thoracic legs have in addition to the foregoing structure a dense brush of setae across the outer distal margin.

The third, fourth and fifth thoracic legs are very short, slender, stick-like, reduced, biramous, *i.e.*, having a single lameliform epipod each.

The abdominal pleopoda but afford no specific characters.

SYNONYMY: *Squilla alba* BIGELOW, R. P., Johns Hopkins Univ. Circular, No. 106, p. 103, 1893.—Proc. U. S. Nat. Mus., vol. 17, p. 539, 1894.

Squilla panamensis variety **B**, Bigelow.

Plate 6.

MATERIAL EXAMINED: Three specimens from Punta Arenas, Costa Rica, March, 1928, taken by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Rostrum three and one-half millimeters long, three and one-quarter millimeters wide, tongue shape, with the anterior margin evenly rounded. Carapace shield-shape, slightly narrowed anteriorly; there is a short, transverse sulcus in the median frontal region behind the rostrum; the frontal margin on either side of the rostrum is excavate and there is a short, acute, outward and forward directed spine on the anterolateral angle; the anterior two-thirds of the lateral margin is excavate and the remainder is produced into a convex lobe at the postlateral angle; the median posterior margin is excavate. There are five longitudinal carinae on the carapace besides the margins. One of these carinae is median and is interrupted posteriorly by the cervical groove, behind which the carina bifurcates, forming a V. The median third of the carapace is separated from the lateral third on each side by a well-defined groove. The inner lateral longitudinal carina is about one-third the distance between this carina and the outer margin and does not extend quite to the anterior margin; posteriorly it is interrupted by the cervical groove, the hinder portion of the carina curves around the postlateral margin paralleling the margin. The second or outer lateral carina extends from the anterolateral spine almost to the posterior margin.

The visible thoracic and abdominal segments are transversely convex; the first and second thoracic segments are short, concealed; the

third thoracic segment is short and has the lateral part prominently produced, narrowed, curved, acute and forward and downward pointing tooth; below which on the ventral surface there is another acute, forward directed spine. The fourth thoracic segment is one and one-half times as long as the third and is considerably longer on the lateral region than is the preceding segment; the lateral margin is cut into a smaller triangle at the anterior angle and a longer unequal-sided triangle at the posterior angle. The fifth and sixth thoracic segments are each equal in length to the fourth, but the lateral margin of the fifth segment is nearly right-angled anteriorly, separated by a very shallow sulcus from the broad triangular area of the posterior angle; the lateral margin of the sixth thoracic segment is nearly right-angled, a little convex on its anterior margin and slightly concave on the lateral margin; the posterior portion of the lateral margin is brief and is concealed by the rounded overlapping flap; the first five abdominal segments are subequal in length; the sixth segment is about a millimeter shorter and about 1.5 mm. narrower on each side. With the exception of the rounded, anteriorly projecting flap of the first abdominal segment, the lateral parts of the six abdominal segments are similar; the margin relatively straight and thickened, terminating at the posterior angle of each segment in an acute tooth. There are eight longitudinal carinae, extending the length of the six abdominal segments. The innermost or submedian pair of these carinae also extends the length of the four visible thoracic segments, as does also the upper lateral pair of carinae. The lower lateral pair of carinae terminate on the flap-like projection of the first abdominal segment; the outermost or marginal pair of carinae lose their continuity anteriorly on this same segment. On the third to sixth abdominal segments each carina terminates posteriorly in a small tooth, those of the third segment being quite weak (possibly absent in some instances) while those of the sixth segment are more emphasized than any of the others.

The telson is about one millimeter wider than long, with a pronounced median keel that ends subdistally in a blunt tooth in old male specimens, or an acute tooth in young adults, below which there is a blunt node between the two submedian elevations which terminate distally in an acute, primary tooth. Between these there are secondary teeth, the number varying from five to seven, on each side of the median notch. In young specimens these secondary teeth are quite bluntly triangulate; in older specimens they are even more rounded. Between the submedian primary teeth and next, or lateral pair of

primary teeth, the margin is concavely excavate, and furnished with nine secondary teeth, similar to the other secondaries. This lateral pair of primaries also has the base elevated or swollen for a short distance back onto the carapace. It is followed on the outer side by a single secondary tooth which in turn is followed on the outer side by another primary tooth whose convex margin extends back to the base of the last primary tooth which is on the lateral margin and extends back as a carina to the base of the telson.

The rhipidura have the shorter part of the basal article of the peduncle with two longitudinal carinae on the upper surface and an acute tooth at the median point of its posterior margin; the produced inner process is as long as the telson and consists of a subrectangular prolongation which has its outer lateral margin slightly convex, the inner lateral margin correspondingly concave; the distal end is incised for half the length of the process by a V-shaped incision, the outer angle a curved, acute spine that extends as far as two-fifths the length of the outer blade; the inner angle is an even longer, acute spine which is equal in length to the outer branch of the uropoda, and bears about midway the length of its inner lateral margin a rounded node which thickens with age, in the males especially.

The inner blade of the uropoda is very narrowly oval and in length extends about one millimeter beyond the node on the long spine of the process; it is heavily fringed on the entire margin with plumose setae. The outer blade has the proximal article in length extending as far as the second primary lateral tooth of the telson and is thickened in the median longitudinal line, with the inner margin very slightly convex, the outer margin armed along its distal half with nine articulated spines, the distal one of which is on the terminal angle and is twice as long as the eighth spine; the distal article of the blade is two-thirds as long as the proximal and is suboval, half as wide as long and densely ciliate.

The antennal segment bears on either side of the rostrum a curved process which at its upper distal angle forms an acute triangulate tooth; the ocular segment bears a shorter rounded, outward-directed process on either side.

The eyes are triangulate, the cornea reniform, set obliquely upon the bulbous stalk.

The antennulae have the peduncular articles slender, cylindrical, the second and third articles the longer, subequal; the three-branched flagella slender, multiarticulate.

The antennal peduncle has the peduncular articles stocky, the distal one with a short, rounded, or blunted tooth, at its outer distal angle. The scaphocerite is narrowly oval, ciliate; the flagellum is composed of two elongate, cylindrical basal articles and about fifty short annulae.

SYNONYMY: *Squilla panamensis* BIGELOW, R. P., Johns Hopkins Univ. Circ., No. 88, 1891; Proc. U. S. Nat. Mus., vol. 17, p. 526, 1891.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, p. 237, 1895.

Squilla (Alima) gracilis Milne Edwards.

MATERIAL EXAMINED: Several specimens taken with electric light at night, Egg Island Harbor, West Indies, January 19, 1925, by the *"Ara."*

DISTRIBUTION: In the plankton, West Indian waters.

DISCUSSION: These larvae correspond in all details with those figured and described by Brooks in the *"Challenger"* Report. The adult form represented by this *Alima* is unknown, but is believed to be a deep-water *Squilla.*

SYNONYMY.—*Squilla (Alima) gracilis* BROOKS, Rept. Stomatopoda Voy. *"Challenger,"* Zoöl., vol. 16, p. 85, pl. 4, figs. 4-6, pl. 5, fig. 3, pl. 6, figs. 3-5, pl. 8, figs. 4-6, 1886.

BRACHYURA.

Subtribe: **Dromiacea.**

Family: **Dromidae.**

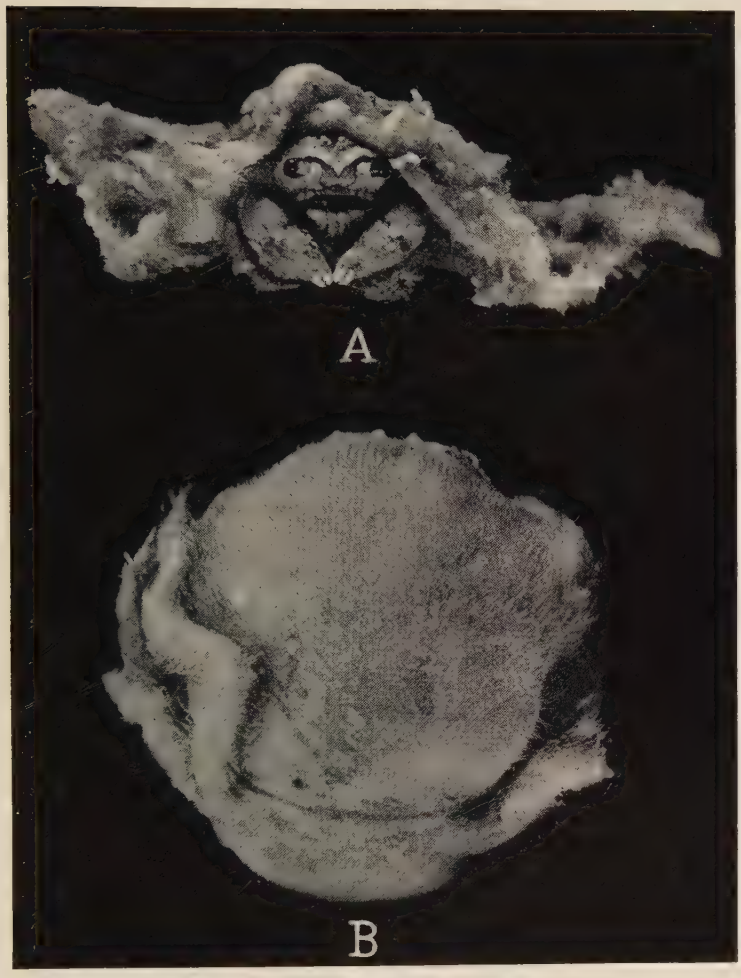
Genus: **DROMIDIA.** Stimpson.

Dromidia antillensis Stimpson.

Plate 7, figs. A and B.

NAME: Sponge carrier crab.

DIAGNOSTIC CHARACTERS: Carapace decidedly convex, longer than wide; densely, finely hirsute; late two pairs of legs reflexed upon the back; with dactyli produced into three interlocking hooks for the purpose of holding a sponge over the crab. An oblique line of four small tubercles running inward from the anterolateral angle across the pterygostomian region to the external distal angle of the maxilliped.



Dromidia antillensis Stimpson, × 1.5.

TYPE: The type material was "found at St. Thomas, by Mr. Riise; at Key Biscayne, Florida, by G. Wurdemann, and at the Tortugas by Dr. Whitehurst." It is probably no longer extant.

DISTRIBUTION: Known from Beaufort, N. C., the west coast of Florida, the east coast of Mexico, Santa Cruz; Porto Rico; Bahamas; the Abrolhos Islands, Brazil. The only record of the megalops is from Swan Island (Bingham, 1926). The *"Ara"* specimen establishes the first record of the species from the east coast of Florida, *i.e.*, Knight's Key and Florida Keys.

MATERIAL EXAMINED: One small, ovigerous female from Knight's Key, Florida, one large ovigerous female from the Florida Keys, tag 492, 1924; one small, sponge-clad male from tag 314, Turtle Harbor, Fla., Nov., 1924, collected by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace decidedly convex in both directions, longer than wide, 31 mm. long in median line; 28 mm. maximum width, across the anterolateral angle. The anterior region is much the wider, the anterolateral margins broadly rounded, the lateral margins slightly convergent posteriorly; the posterior margin relatively straight. The interorbital space is narrow, the frontal margin is produced to a triangular apex which is bent downward at the median point below and between the more prominent teeth of the inner orbital angles. Running obliquely inward from the anterolateral angles across the pterygostomian regian to the external distal angle of the maxilliped is a row of four small, well-spaced tubercles, each of which is but little more than a large granule. On the upper surface of the carapace there is a deep longitudinal sinus on each side of the cardiac region between it and the branchial lobes; there is also an obscure, transverse groove running across the branchial lobe and terminating at a small blunt tooth on the lateral margin. The female abdomen in the egg-laden specimen is very prominent dorsally, suboval, convex; it consists of seven segments, which form a broad belt. The male belt is narrow, with a triangulate tip.

The chelipeds are equal, stocky; the merus trigonal in cross section, closely appressed to the body, its distal end barely visible dorsally; the carpus two-thirds as long as the merus with its upper surface rounded, the palm is short and broad, convex on its outer surface, its height almost equal to its width; the fingers are pearly white, very stocky, with a slight basal gape; the upper finger is very curved, its

distal end crenulated, fitting closely upon the lower; the entire cutting edge of both fingers is dentate. The lower finger is shorter than the upper.

The first and second ambulatories are long, laterally flattened, except the dactyl, which is conical, very curved, with a long, sharp tip.

The third and fourth ambulatories are shorter, subdorsal in position, reflexed upon the back, the fourth pair lying directly upon the posterior part of the carapace; the fifth pair shorter, below and behind it. The dactyl of the fourth leg is curiously long and curved forward and has on its outer lateral margin near the base a small, outpointing, curved spine. The long spine interfits between two shorter, acute, curved spines, which pair arise from the anterolateral angle of the dactyl and are directed posteriorly. The dactyli of the fourth legs are similar to those of the third pair in structure, except that the long dactyl tip lacks the accessory basal spine and is directed posteriorly, while the paired, shorter spines between which it locks are directed forwards.

The entire animal is densely covered with stiff, short, upstanding, multispinose setae.

This crab affords an excellent study of the primitive structure of antennae and antennulae in relation to the orbit and mouth cavity.

Synonymy: *Dromidia antillensis* Stimpson, Proc. Acad. Nat. Sci. Phila., p. 225, 1858.—Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 71, 1859.—S. I. Smith, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 17, 1869 (gives detailed measurements). Benedict, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 132, 1901.—Verrill, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 431, fig. 51, pl. 28, figs. 2 and 3, 1908.—Rathbun, Ann. Inst. Jamaica, vol. 1, art. 1, p. 39, 1897.—Rathbun, Rapport betreffende een vooloopiz onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 331, 1907.—Rathbun, Univ. Iowa Studies Nat. Hist., vol. 9, No. 5, p. 66, 1921.—Hay and Shore, Bull. U. S. Bur. Fish., vol. 35, p. 417, 1918.—Boone, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 48, fig. 10, 1927 (gives description of megalops and figures of same).

Dorippe lanata (Linné), natural size.

Tribe: **OXYSTOMATA.**

Family: **Dorippidae.**

Genus: **DORIPPE** Fabricius.

Dorippe lanatus (Linné).

Plate 8.

DIGNOSTIC CHARACTERS: Carapace shield-shaped, flattish, regions sharply defined, but little convex, grooves deep, the cardio-intestinal region sharply circumscribed; a rosette-like arrangement of five radiating rugae occurs on the summit of the intestinal region. The entire dorsal surface of carapace and legs is covered with a thick, short, dirty yellow pilosity.

TYPE: Linnaeus' type came from the Mediterranean Sea.

DISTRIBUTION: Mediterranean Sea, Gibraltar and adjacent Atlantic shores. Usually found in depths ranging from 50 to 100 meters. Also West Africa, down to the Cape of Good Hope.

MATERIAL EXAMINED: Two males and one female dredged in 35 fathoms, five miles northeast by north of Cape Carthage, Gulf of Tunis, Mediterranean Sea, July 21, 1927. One vigorous female dredged in 100 fathoms, nine and one-half miles East by South ½ South from Cape Bon Tunis, North Africa, July 19, 1927, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace flattish, regions sharply defined, but little convex, interorbital region 9 mm. wide; rostrum less protuberant than the inferior inner orbital tooth, narrow, shallowly bidentate, the space between the rostral teeth widely U-shaped; the tips of the inner maxillipeds fitting between these on the lower side and forming a tube-like channel; posterior to the depressed rostrum and on a higher plane are the subequal preorbital teeth. The orbital cavity is deep, oblique, with the postorbital tooth acuminate, more protuberant decidedly than the preorbital. The anterolateral margins are oblique, decidedly divergent posteriorly; a short, acuminate spine marks their union with the posterolateral margin which is broadly, evenly rounded; the posterior margin is sinuate. The entire dorsal surface is covered with a dense pilosity composed of short, close, club-like hairs. The intestinal and cardiac regions are circumscribed by a deep groove; the cervical groove runs outward and forward, bifurcating, one branch extending out to the lateral margin and the other

going forward to behind the orbital cavity where it unites with a transverse groove which extends across the frontal region. There is also a deep groove extending outward and forward across the branchial region from near the urogastric groove. The gastric and hepatic regions are moderately convex, the intestinal region bears a rosette-like arrangement of five radiating rugae; the branchial region is moderately convex. The first, second, third and fourth abdominal segments of the male are dorsally visible, narrow, densely setiferous; the other three are entirely ventral, the last segment being triangulate with the tip rounded. The sternal plastron is wide, flattish densely setiferous. The pterygostomian region is setose, concave a little in advance of the breathing aperture which is densely fringed by regular, stiff setae.

The external maxillipeds narrow distally; the exognath is rod-like, extending to midway the lateral margin of the merus; the ischium is much wider and slightly longer than the merus and is produced to a distinct rounded lobe at its inner distal angle; the merus is almost as long as the ischium but is much narrower and narrowed distally with its inner lateral face channelled and sinuate for the reception of the palp—the long, cylindrical second joint of which fits between the laminate projection of the outer distal and inner lateral margins; the distal article of the palp is small, conical. The entire outer face of the maxilliped is densely setiferous.

The antennulae have the second and third joints long, cylindrical, folding obliquely.

The antennae are small.

The chelipeds are equal in the female but are decidedly unequal in the male. The meral joint is arched, small, three-sided, with both lower lateral margins fine dentate; the carpus is small, of irregular shape, moderately convex, produced to a tooth at its inner distal angle; the propodus in the female is scarcely wider than the preceding joints and is decidedly arched; the palm is short, moderately convex, three-fourths as high as long; the fingers are deflected, about one-third longer than the palm, tapering; the outer face of each finger with two longitudinal ridges separated by grooves; the cutting edges regularly dentate, meeting; tips curved. In the males the chelipeds are markedly unequal, the propodus on the right side having the palm fully twice as much inflated as on the left, the height of the right

propodus being almost equal to its width; the right fingers are slightly shorter than the palm and are sharply deflected, each bears two longitudinal converging ridges on its outer face, the cutting edges are regularly crenulate and the right chela has a small basal gape. The left cheliped has the palm only two-thirds as wide as long, moderately convex and the fingers greatly elongated and curved being one and one-half times as long as the palm, the cutting edges dentate, no gape.

The first and second ambulatories are greatly elongated, subequal, each with the meral joint slightly exceeding the maximum width of the carapace, of moderate width, densely setose and with a line of spines paralleling the anterior lateral margin; the carpus and propodus together are equal in length to the merus, but are distinctly narrower; the carpus comprises one-third of this length and the propodus, two-thirds; the dactyl is about as long as the propodus and is very curved and slightly twisted; both faces are marked with longitudinal carinae separated by deep grooves.

The third and fourth pairs of legs are subdorsal in position and are much smaller than the preceding pairs. The third legs if straightened would scarcely reach to the tip of the merus of the second legs. The meral joint of the third legs is the longest joint, the carpus is three-fourths as long as the merus; the propodus is very short and bears at its posterior basal angle a node-like tooth upon which the tip of the short, curved, acuminate dactyl closes. The fourth legs are more dorsal in position than the third which they resemble in all details of structure, except that they are much frailer and only two-thirds as long.

SYNONYMY: *Cancer lanatus* LINNE, Syt. Nat., 12 ed., t. II, p. 1044, 1766.

Dorippe lanata BOSC, Hist. Nat. des Crust., t. I, p. 208, 1802.—HELLER, Crust. Sudl. Europa, p. 138, pl. 4, fig. 9, 1863 (and synonymy).—A. MILNE EDWARDS and BOUVIER, Exped. Sci. du Travailleur et du Talisman, Crust. Décapodes, 1900, p. 33.—O. PESTA, Die Decapodenfauna der Adria, 1918, p. 286 (and major synonymy).—STEBBING, Ann. South African Mus., vol. 6, p. 339, 1908-10.—IHLE, J. E. W., Mon. Siboga Exped., 39b-1, p. 156, 1916.

Cancer facchino HERBST, Naturg. Krabben u. Krebse, t. I, pl. 2, fig. 68, 1783.

Family: Raninidae.

Genus: **RANINOIDES** H. Milne Edwards.

Raninoides laevis lamarcki A. Milne Edwards and Bouvier

Plate 9, figs. A, B. and C.

TYPE: The type of this species was taken by the *"Blake"* West Indian expedition.

NAME: Burrowing crab; frog crab.

DIAGNOSTIC CHARACTERS: Only species so far recorded from tropical America. Carapace concave, twice as long as wide, lateral margins converging anteriorly, and much more so posteriorly; one acute lateral tooth somewhat behind the postorbital spine; rostral tooth triangulate, two submedian shorter teeth; an acute tooth separated from the rostral area and also from the preorbital by a sinus. First legs chelate, propodus armed with four spines; upper finger with one sub-basal spine.

DISTRIBUTION: Known from the West Indian region and also from the Perlas Islands, which latter record is first established by the *"Ara"* material.

HABITS: Little is known of this peculiar burrowing crab, of which the *"Ara"* specimens appear to be the third record. It belongs to a family whose members spend the greater part of their time burrowed in the sand with only the eyes and antennae exposed. The feet are falcate and form remarkably efficient diggers; even the shape of the body conforms to this habit. When resting, the crab, viewed from the front has an odd, frog-like aspect, hence its common name.

MATERIAL EXAMINED: One egg-laden female dredged in 70 fms., southwest of Marquesas Keys, Florida, March 2, 1924; one male and one female taken in the Perlas Islands, February 19, 1928, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace 24 mm. maximum length, 12.5 mm. maximum width, decidedly elongate-ovate, very convex, the frontal margin almost twice as wide as the extreme posterior margin of the carapace, which, however attains its maximum width two-fifths of the length from the frontal margin. The maximum width is twenty percentum greater than the frontal width. The frontal margin is divided into five lobes, of which the median lobe comprises approximately one-half the width of the frontal border and is produced into an acuminate, triangulate median rostral tooth which projects beyond

Raninoides laevis lamarcki A. Milne Edwards and Bouvier, natural size. A.—Female, West Indian specimen. B.—Female, Perlas Islands. C.—Male, Perlas Islands.

the pair of submedian, acuminate, triangulate teeth which are separated from the median tooth by a concave margin and which form the outer angles of the median lobe. There is a smaller lobe on either side of the median lobe and separated from it and also from the outer lateral lobe by a deep sinus on each side. This intermediate lobe is two-fifths as wide basally as the median lobe, tapering forward, forming a rather broad, triangular tooth which has the outer lateral margin more accentuated than the inner, the tip decidedly acuminate, and extending as far forward as the apex of the external lobe. The external lobe is a trifle wider than the intermediate lobe and has its inner angle forming a short, bluntish tooth whose apex forms the outer angle defining the sinus which separates the two lobes. The external angle of the outer lobe forms a slender, triangulate, spine-like tooth which, as stated previously, extends as far forward as the apex of the intermediate lobe; the margin of the external lobe between the inner and outer angle is concave. The sinus between the median and intermediate lobes extends backwards as an open channel for a distance equal to four-fifths of the length of the rostrum; from the base of the open channel a decided concave groove and the open channel are contiguous and are set with long, spinose setae which project obliquely above and across the opening, making it difficult to distinguish where the sinus ends and the groove begins, which difficulty is increased by the abundance of setae on the adjacent frontal region. The sinus between the intermediate and external lobe is as deep as the one between the median and intermediate lobe and has a similar concave groove behind it. Behind the postorbital tooth and separated from its base by a distance equal to almost one-third of the width of the carapace at this point, the lateral margin is produced into a prominent, sharp, triangulate tooth which is directed obliquely outward and forward. This spine is very prominent, being wider basally, longer and more acuminate than the external orbital spine. The lateral margins of the carapace are carinated and finely crenulate or bluntly serrate; they are also fringed with close, fine, plumose setae which arise from the lower face of the carapace and are especially abundant on the pterygostomian region.

The abdomen of the female narrows posteriorly and is vaulted and bent under, the first segment being 4.5 mm. wide and 2 mm. long, with the lateral margins relatively straight and the posterior margin arcuate; the second segment is slightly wider and shorter than the first and has its lateral margins slightly convex; the third segment is a

little shorter than the second and has its lateral margins less flaring; the fourth and fifth segments are successively shorter and decidedly vaulted; the sixth segment is very small; the telson is a small, triangular protuberance, narrowing posteriorly and with the apex rounded. There are four pairs of abdominal appendages in the female which arise from the second to fifth segments respectively. Each branch is slender and narrow, arching inward toward the median ventral line, and is heavily fringed with long, multiplumose setae. The female apertures are on the ventral face of the coxal joints of the fourth pair of legs. The male appendages consist of a pair of long articles which seem to arise from the under side of the third abdominal segment where a bifurcation of the trigonal under part of the abdomen occurs; the basal part of the first pair of appendages is flattish and bent, forming a short, peduncular article; the distal article is enlarged proximally, where it is irregularly shaped, convex, and has an internal cavity in which the distal part of the second pair of appendages is encased; the first pair of appendages narrows distally into a somewhat compressed, cylindrical rod which has the extreme tip flattened and produced into a membranaceous semicircular process with the ends or tips pointing posteriorly. The second pair of appendages appears to arise from the fourth abdominal segment, close behind the first pair of appendages which it resembles; the peduncular being quite similar but smaller, the distal article being dilated differently, forming a rounded, compressed node, beyond which the distal three-fourths of the article tapers abruptly to an acuminate tip which is sheathed in the central cavity of the dilated portion of the first pair of appendages. The lateral margins of all the abdominal segments are heavily set with long plumose setae, as are also the under surfaces of the proximal joints of the fourth pair of legs. This pilosity surrounds and conceals the male appendages.

The inner antennae have the first visible peduncular article rather wide and long, reaching as far forward as the distal margin of the second joint of the outer antennae; and armed at its inner distal angle with a series of exceedingly long, plumose setae which extend as far forward as the distal end of the third article; the second article is only about half as long as the preceding one and is small, cylindrical; the third article is similar to but nearly twice as long as the second, the fourth article is similar to the third but not quite so long, and the supports the biramose flagellum, which has an outer branch composed

of eleven tapering articles, and a smaller, inner branch consisting of seven tapering articles.

The external antennae have a short, wide, truncate peduncular article which can be seen only in a basal view; the second article is nearly twice as long as the first article, arises from the outer side of the latter and extends as far forward as the distal margin of the first visible segment of the antennulae, and is furnished with a series of heavy, plumose setae along both lateral margins; the third article is narrower and a little shorter than the second and curves outward distally like a horn; the inner lateral margin is furnished with very long, plumose setae and the outer lateral margin is beaded and furnished with fewer and shorter setae than the inner margin; the fourth article is approximately three-fifths as long as the third and is small, cylindrical, supporting a well-developed flagellum composed of nine or ten annulations, each of which is furnished on the distal margin with several, long, stiff, radiating setae.

The external maxillipeds are long, narrow and close-fitting; the exognath has its merus very slender, somewhat curved and almost three times as long as the ischium, extending a trifle beyond the distal margin of the ischium of the endognath. The ischium of the endognath is about one and one-half times as long as its merus, and is nearly twice as wide as the exognath, becoming gradually wider distally with the outer lateral margin convex, and the distal margin concave with the inner distal angle more advanced than the outer; the merus is slightly broader than the ischium and has its outer lateral and distal margin rounded; a slender, three-jointed palp arises subdistally from the inner lateral margin and consists of a small, subcylindrical, basal article, a longer, wider, more flattish second article, which has its inner lateral margin unequally convex and set with a series of subequal spines; the distal article is a little shorter than the preceding one and tapers to a point distally; its inner lateral margin is also set with spines like those on the preceding article, but the distal spine is hook-like and twice as long as any of the others. The tip of the merus of the endognath reaches forward almost as far as the distal margin of the second article of the external antennae.

The first pair of legs are chelate and have the shape typical of Raninidae and are subequal in both sexes and to each other. Each has the coxa and basis short; the ischium is thick, nearly half as long as the merus, with the inner distal angle produced to a point, and with a prominent, sharp, acuminate spine placed subdistally on the anterior

lateral margin; the remainder of this anterolateral margin is rather coarsely serrate from the base of the above spine to the proximal end of the ischium; the merus is the longest joint of the leg and is compressed dorsoventrally with both surfaces slightly convex, broader proximally, tapering distally and armed at its anterior distal margin with a single long, acuminate spine which is directed forward; the carpus is almost half as long as the propodus and has the upper and outer surfaces rounded and is produced subdistally into two spines, the outer of which is triangular and nearly twice as long as the inner spine with which it is connected basally by a wide, concave margin; the propodus is nearly as long as the merus but is more flattish; the dorsal edge is carina-like, set with short setae and has a single, prominent, acuminate, subdistal spine; the ventral edge is armed with four large triangulate spines; the propodal finger is produced inwards almost at right angles to the palm and is narowly triangulate and armed on the cutting edge with nine or ten broad, triangular teeth in addition to the apical tooth; one or two of these teeth has a minute, sharp tooth at its base. The hinged finger is very slender, tapering and curved, devoid of teeth on the cutting edge but armed on the dorsal edge with a single, sharp, long spine which is subproximal in position.

The second, third and fourth pairs of legs are similar in structure, but the second pair are much smaller in both sexes, than the next pair. Each leg has the proximal joints small, the merus subcylindrical and arched, conforming to the side wall of the body; the carpus is somewhat dilated distally; the propodus is curiously shaped, being broader than long and rounded on its upper margin; the dactyl is laminate, unequally lanceolate-ovate, with the margins rounded and tapering to an acuminate point. The carpus, propodus and dactyl are intimately articulated, forming a digging process. The outer margins of the merus, carpus, propodus and dactyl are fringed with long setae. The dactyl of the third leg is larger and wider than that of the second leg.

The fourth pair of legs are subdorsal in position and are the smallest of the series; each has the ischium and merus elongated, subequal in length, cylindrical; the carpus, propodus and dactyl are similar to those of the preceding leg but are very small and fragile.

Synonymy: *Raninoides laevis lamarcki* A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, p. 229, pl. 1, figs. 8 and 9, pl. 2, figs. 4 and 5, 1923.

Family: LEUCOSIIDAE.

Subfamily: Leucosiinae.

Genus: **PERSEPHONA** Leach.

Persephona edwardsii Bell.

Plate 10, fig. A.

NAME: This species was named in honor of the distinguished French scientist, Prof. Henry Milne Edwards, of the Paris Museum.

DIAGNOSTIC CHARACTERS: This species is undoubtedly closely affiliated with *Persephona orbicularis* Bell, from which it is distinguished by the different coloration, being uniformly pale buff; by the fact that this species is uniformly slenderer and has the frontal part of the carapace narrowed anteriorly and somewhat produced, and the pterygostomian angle and tooth of *orbicularis* is obsolete in *edwardsii*. The three posterior spines in *edwardsii* are similarly placed, except that the median spine is only half as high above the submedian spines as in *orbicularis*. The male abdominal belt has the first, second and third segments narrow, hinge-like, the third segment is closely fused with the succeeding segment but has a weak divisional line; the fourth, fifth and six segments are completely anchylosed; the seventh segment is small, subtriangulate, with the lateral margins convergent, the tip evenly rounded.

TYPE: Founded on two specimens collected in the Galapagos Islands, depth 6 fms., and believed to be no longer extant.

DISTRIBUTION: Galapagos Islands, Panama, and Perlas Islands, Bay of Panama.

MATERIAL EXAMINED: Two males, taken at Saboga, Anchorage, Perlas Islands, February 19, 1928, establish the first record of the species from Perlas Islands.

TECHNICAL DESCRIPTION: Carapace moderately globose, slightly longer than wide, 22 mm. long to base of posterior spine, 20 mm. maximum width, convex, with the frontal part narrowed anteriorly and somewhat produced, the pterygostomian angle obsolete, no tooth. The frontal region is narrow, depressed medially but not produced to a point, the frontal line heavy, wavy; the preorbital angle blunt, rounded; the postorbital angle rounded, a trifle more prominent than the preorbital angle; the upper ocular border with three closed sinuses,

two rounded teeth; the entire fronto-orbital region densely hirsute as is also the under frontal region; on the upper surface behind the hirsute region, the narrow part of the carapace is naked, smooth, for quite a distance behind which the narrow, convex surface is ornamented with small pearly granules, which are invisible to the unaided eye except along the lateral margin where they are larger. There is a strong, outward and upcurved spine on the posterior region of the carapace in the median line, and slightly below it and outside it on either side is a similar spine which is about three-fourths as long as the median spine; these three spines form an obtuse angle; the median spine is only half as high above the submedian spines as in *P. orbicularis.*

The male abdominal belt has the first, second and third segments narrow, hinge-like, the third segment is closely fused with the succeeding segment but retains a weak line indicating the fusion; the fourth, fifth and six segments are completely anchylosed; the seventh segment is small, subtriangulate, with the lateral margins convergent, the tips evenly rounded.

The chelipeds and ambulatories are similar to those of *P. orbicularis,* but they are distinctly slenderer and the fingers of the chelae do not gape.

Both pairs of antennae are similar to those of the preceding species.

The eye is conical, light brown and a trifle less hooded than in *orbicularis.*

The external maxillipeds are smooth externally, the tip of the exognath broadly rounded; the tip of the merus of the endognath narrowed, more so than in *orbicularis;* the external faces of both the sets of meral joints of the maxilliped are densely tomentose.

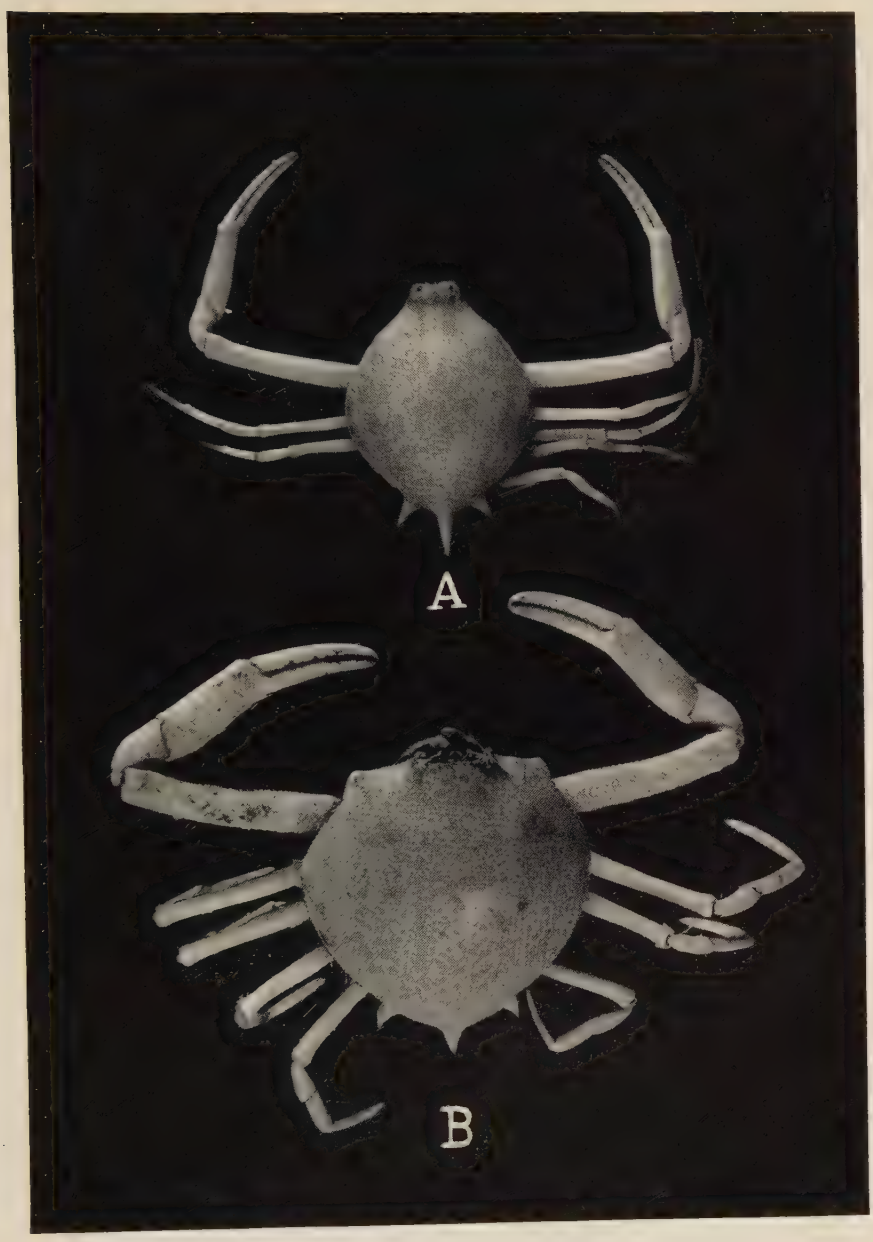
The tips of the septa of the branchial channels are not visible in a dorsal view.

Synonymy.—*Persephona edwardsii* Bell, *Horae Carcinologicae,* vol. 21, p. 294, pl. 31, fig. 8, 1855; Rathbun, Proc. U. S. Nat. Mus., vol. 38, p. 595, 1910; Boone, Zoölogica, N. Y. Zoöl. Soc., vol. 8, No. 4, p. 284, text fig. 101, 1927.

Persephona punctata Linné.

Plate 10, fig. B.

Diagnostic characters: Only member of the genus thus far described from the West Indian region. Body globose, covered with



A.—*Persephona edwardsii* Bell, natural size. B.—*Persephona punctata* Linné, natural size.

numerous microscopic granules. Front produced to a small median point; pterygostomian region angulated, with one tooth; median posterior region armed with one tooth, outside of which and a little below it on each side is another similar tooth. Chelipeds elongate, moderately slender.

TYPE: Linnaeus' type came from the Antilles.

DISTRIBUTION: Rather sparsely known from North Carolina southward through the West Indies; Porto Rico, and Gulf of Mexico, to Sabanilla, Colombia. Marcgrave recorded it from Brazil nearly one hundred and fifty years ago.

MATERIAL EXAMINED: One large female from Colon, Panama, 1926, dredged in shallow water; one male from the same locality. One small male, taken in dragnet, 2 fms., Limon Bay, Panama, January 21, 1928.

COLOR: Plum purplish, with irregular marmorations of darker color; granules white or tinged with plum red.

TECHNICAL DESCRIPTION: Carapace globose, convex, sparsely covered with microscopic granules which form a visible beading along the margin; frontal region, narrow, depressed medially and produced to a weak tooth, inner and outer orbital angles blunted; the upper orbital surfaces with three sutures; the dentate angle of the branchial groove is visible dorsally. The pterygostomian region is produced, decidedly angulated and armed with an out-pointing tooth. There are three spines on the posterior region, one placed medially, directed outward and upward and on either side and a little below this is a similar spine. The female abdomen is wide, the first, second and third segments narrow, hinge-like, arched medially, their lateral margins quite arcuate; the fourth, fifth and sixth segments are completely fused forming a broad, subcircular shield that covers practically the entire sternal region between the legs, the seventh segment is small, triangulate, with the distal end rounded. The male abdomen is triangulate, decidedly wider in *punctata, i.e.,* nearly a third broader than that of *orbicularis;* the first, second and third joints are narrow, hinge-like; the fourth, fifth and sixth segments are completely anchylosed; the seventh is small, triangulate, with the tip rounded.

The chelipeds and ambulatories are quite similar to those of *orbicularis,* described on page 58, except that they are less granulose, the upper male finger in *punctata* is not quite so curved and long, and the fingers have no gape.

The external maxillipeds have the tip of the exognath more broadly rounded than that of *orbicularis* which is triangular. There is in *punctata* a distinct longitudinal groove on the ischium near and subparallel to the inner margin; outside this on both ischium and merus is a row of stiff, brush-like setae and outside this is a row of heavy granules. The remaining outer surface of the maxilliped is granulose; so also is the adjacent under part of the body.

SYNONYMY.—*Guaia alia* MARCGRAVE, GEORGE, DE LIEBSTAD, Historia Rerum Naturalium Brasilae, p. 182 and text figure, 1648.

Cancer punctatus BROWN, Civil and Natural History of Jamaica, vol. 2, p. 422, pl. 42, fig. 3, 1856.

Cancer punctatus LINNÉ, Syst. Nat., ed. 10, p. 630 (part), 1758.

Persephona latreillei LEACH, Zoöl. Misc. III, p. 22, 1814.

Persephona lamarcki LEACH, op. cit., p. 22.

Guaia punctata GIBBES, Proc. Amer. Assoc. Adv. Sci., p. 185, 1850.

Persephona guaia BELL, Trans. Linn. Soc. London, vol. 20, p. 292, 1855.

Persephona punctata COUES, Proc. Acad. Nat. Sci. Phila., vol. 30, p. 123, 1871.

Persephona punctata STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 70, 1860.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 403, 1879.

Persephona punctata RATHBUN, Ann. Inst. Jamaica, vol. 1, pt. 1, p. 38, 1897; Report U. S. Fish Comm., vol. 20, pt. 2, p. 87, 1901.—HAY and SHORE, Bull. U. S. Bur. Fish., vol. 35, p. 424, pl. 32, fig. 9, 1918.

Persephona orbicularis Bell.

Plate 11, figs. A and B.

NAME: West Coast Purse Crab.

DIAGNOSTIC CHARACTERS: Carapace globular, covered with pearly granules; a well-developed tooth pointing out and forward on the pterygostomian region. A strong outward and slightly upward directed tooth on the posterior region in the median line; below this and outside it on each side is a similar tooth, the three forming a right-angled triangle. The frontal region in *orbicularis* furnishes one of its most

Persephona orbicularis Bell, A.—female, B.—male, natural size.

distinguishing characters from *P. punctata;* in *orbicularis* the front is about the same width as in *punctata,* but the median depression is shallower and the frontal margin is much less produced in the median line. The pre- and postorbital angles are also much more heavily, bluntly rounded than are those of *punctata.* This species is the West Coast analog of *Persephona punctata* Linne. In living specimens the coloration of *orbicularis* is very different, being a blood red reticulated with dull ocher on the central part of the carapace. *P. orbicularis* is also densely covered with coarse pearly granules, whereas *P. punctata* is covered with coarse punctae, and in rare cases, in old specimens has pearly granules, but these are neither so large nor so abundant as in *orbicularis.*

TYPE: Mr. Bell's type was taken at Valaparaiso, Chile, by a Mr. Miller, a surgeon in the British Royal Navy, and deposited in the Bell collection which is believed to be no longer extant.

DISTRIBUTION: Valparaiso, Chile, and Perlas Islands. Shallow water.

MATERIAL EXAMINED: One large male and one female taken at Saboga Anchorage, Perlas Islands, March, 1928, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace globose, very convex, densely beaded with coarse, pearly granules; pterygostomian region prominent, with a well-developed tooth pointing outward and forward. There is evidently some variability in this spine. As shown in plate 11, it is most developed in the male, less so in the female. There is prominent, outward and slightly upward directed tooth on the posterior region in the median line but above the postlateral margin; on either side of this tooth outside and below it is a similar tooth, the three forming a right angle. In the two West Coast specimens before me the teeth are distinctly closer to each other than are those of *P. punctata,* and the median spine is higher up on the carapace; in fact, it is the teeth are distinctly closer to each other than are those of *P. punctata.* The side walls in *orbicularis* are very densely granulated, as is also the sternal region and the abdominal belt of the female. The female abdominal belt has the first, second and third segments narrow, hinge-like, strongly vaulted in the median region, the fourth, fifth and sixth segments are completely fused, forming a large, subcircular, convex pouch which covers the entire sternal region between the chelipeds and backward as far as the anterior margin of the fifth legs; the sev-

enth segment is a small elongate triangle with the distal margin rounded.

The male abdominal belt is a narrow, elongate triangle, the first and second segments hinge-like; the third, fourth and fifth segments are completely anchylosed; the sixth segment is one-half as long as the preceding segment, the seventh segment is three-fifths as long as the sixth and rounded at the tip.

The frontal region in *orbicularis* has a distinctly shallower median depression and its frontal margin is much less produced in the median line than that of *punctata*. The pre- and postorbital angles are also more heavily, bluntly rounded than those of *punctata*. Three closed, linear sinuses occur on the upper orbital margin, between the angles.

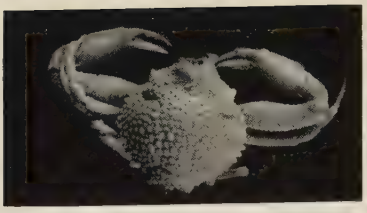
The eye is small, the cornea terminal, shining black, not projecting beyond the orbital margin which is heavily fringed with close-set setae.

The antennulae are well developed and fold horizontally beneath the orbital border in the fossett; the first and second articles are large, subequal, cylindrical; the flagella are much reduced and furnished with a brush of setae.

The antennae are much reduced and are situated in the infra-orbital sinus.

The close-fitting external maxillipeds, depicted in plate 11, have the distal margin of the exognath more bluntly triangulate at the tip, while in *punctata* it is rounded; there is a decided longitudinal groove near and approximately paralleling the inner margin of the meral and ischial joints of the endognath and outside it a very definite submedian, longitudinal line or brush of setae; outside this brush and subparallel to it is a row of large granules.

The chelipeds are much longer in the male than in the female, slender, the merus being subcylindrical, two-fifths longer in the male than in the female, densely granulose; the carpal joint is one-fifth as long as the male merus, narrowed basally, dilated distally; the male propodus, including the fingers, is a trifle longer than the merus, arcuate, the palm moderately rounded, of equal length with the lower finger, both dorso-ventrally compressed, the hand moderately rounded, the finger tapering, flattish, with a brief but distinct gape at the base, the cutting edge is divided into a series of small, flat, blunt denticles; the upper finger being curved is slightly longer than the lower and its tip curves down and projects beyond that of the lower finger. The



Randallia ornata (Randall), young, natural size.

female chelipeds differ from the male only in length and the fact that the female fingers have no gape.

The ambulatories are subsimilar, slender, successively decreasing in length posteriorly; each has the meral joint cylindrical, elongated, the carpal and propodal joints together are not quite as long as the merus and laterally compressed; the propodus, which is as long as the carpus, is produced to a carina on the upper or posterior margin; the dactyl is as long as the propodus but is sabre-like, tapering to an acuminate point; the broad side of the dactyl is set in line with the narrow carinate edge of the propodus; the thin, laminate margins of the dactyl are set with close-set setae.

SYNONYMY.—*Persephona orbicularis* BELL, Trans. Linn. Soc. London, vol. 21, p. 294, pl. 31, fig. 7, 1855.

Genus **RANDALLIA** Stimpson.

Randallia ornata (Randall).

Plate 12.

DIAGNOSTIC CHARACTERS: Carapace orbiculate; in the young densely set with coarse, rounded granules, in older specimens less granular, sometimes nearly smooth; pterygostomian region swollen, in young specimens ornamented with large granules, sometimes simulating a tooth, this becomes less obvious with age; the posterior region is elevated, ornamented with a pair of submedian spines each of which is in line with the part of the sulcus circumscribing the domed intestinal region; outside of these is a lateral pair of tubercles which are as far, or slightly more or less so, from the median tubercles than these latter are from each other. Legs typically *Leucosid.*

TYPE: Randall's type, a female, 30.5 mm. long, was taken in "upper California" and is deposited in the Philadelphia Academy of Natural Sciences.

DISTRIBUTION: Mendocino County, California; Magdalena Bay, Lower California, and Punta Arenas, Costa Rica.

MATERIAL EXAMINED: One young female taken at Punta Arenas, Costa Rica, by the "*Ara,*" William K. Vanderbilt, commanding.

COLOR: Mr. Randall states that the body is variegated with sanguineous spots which are confluent anteriorly; the chelipeds are variegated with red.

TECHNICAL DESCRIPTION: Carapace globular, very convex, longer than wide; frontal region with a median depression, but little pro-

duced; frontal line slightly wavy; superior orbital margin with three sutures, angles rounded, obscure; pterygostomian region swollen, in young ornamented with a large granule which sometimes simulates a tooth, this becomes less obvious with age. The cervical, urogastric, and particularly the intestinal grooves are very sharply defined in young specimens. In the young there are a number of large, rounded granules covering the surface of the carapace; these are much smaller on the frontal region. In older these tubercles disappear or become much smaller and scattering. The posterior, or intestinal region, is elevated, dome-like, ornamented on the posterior margin with a pair of submedian spines, each of which is below and in line with the lateral part of the sulcus which circumscribes the intestinal region; outside of these is a lateral pair of tubercles which are as far, or slightly more or less so from the median tubercles, than these latter are from each other.

The chelipeds are typically *Leucosid;* the merus in the female is two-thirds as long as the carapace is wide; in the male it is slightly longer; cylindrical, granulose in the young, less so in the older specimens; the propodus is somewhat swollen, the fingers slender, curved.

The ambulatories are typically *Leucosid.*

SYNONYMY.—*Ilia ornata* RANDALL, Journ. Acad. Nat. Sci. Phila., vol. 7, p. 129, 1839.

Randallia ornata STIMPSON, Journ. Boston Soc. Nat. Hist., vol. 6, p. 471, pl. 19, fig. 3, 1854.—HOLMES, Occas. Papers Calif. Acad. Sci., vol. 7, p. 100, 1900.—RATHBUN, Harriman Alaska Exped. Crust., vol. 10, p. 170, 1904.—WEYMOUTH, Stanford Univ. Publ. Univ. Ser., No. 4, p. 18, pl. 1, fig. 3, 1900.—BAKER, Rept. Laguna Mar. Lab., vol. 1, p. 102, 1912.—SCHMITT, Calif. Univ. Publ. Zoöl., vol. 23, 1921, p. 188, fig. 116.

Family: **MATUTIDAE** McLeay.

Genus: **HEPATULUS** Fowler.

Hepatulus princeps (Herbst).

Plate 13.

NAME: Brown box crab.

TYPE: Herbst's type specimens were recorded as from the East Indies.

DIAGNOSTIC CHARACTERS: Carapace broad, convex, evenly rounded

Hepatulus princeps (Herbst), about two-thirds of natural size.

anteriorly, 12 squarish, finely dentate teeth on the anterolateral margin. Body mud brown with arcuate lines of broken reddish spots.

DISTRIBUTION: This species has an extensive range, having been reported from the East Indies (type locality), from the West Coast of Africa, from Guinea and from the Cape of Good Hope (Herklots); from Georgia throughout the West Indies to the shores of Brazil as far south as the mouth of the Amazon.

MATERIAL EXAMINED: One male dredged in Limon Bay, Panama, February 26, 1926. Two males dredged by the "*Ara*" in 5 fathoms, south of Catalina Creek, Cuba, February 14, 1924.

HABITS: This crab spends most of its time burrowed completely in the coral sand, with only its eyes and breathing aperture exposed. Its big claws fit closely together across the front. When these are folded and the small legs withdrawn under the carapace, the animal is shut up, as if in a box. When in danger, it assumes this attitude.

COLOR: The carapace is mud brown, covered by small reddish brown spots which are arranged in arcuate lines. This color pattern is continued on the dorsal area of the carpus and hand. The ambulatory legs are alternately banded with broad markings of reddish brown and light yellow. The underside of the animal is creamy yellow.

TECHNICAL DESCRIPTION: Carapace broad, convex, evenly rounded anteriorly, decidedly narrowing posteriorly; branchial regions small; hepatic regions greatly developed. The anterior margin of the front is thick. The anterolateral margin is divided into 12 squarish teeth each of which is finely dentate. The orbits are small, subcircular, in line with the front; the line which extends from the outer orbital angle obliquely to the carapace is clearly marked by rounded granules. Antennulae oblique. Antennae situated at inner angles of orbit. Mouthparts typical. Chelipeds strong, when flexed, they fit closely against the surface of the body; the upper margin of the hand is flattened into a slight crest consisting of four major dentations; the outer surface of the hand is marked by four longitudinal rows of close-set tubercles in high relief and a few scattered tubercles. Ambulatory legs subequal, smooth except for small pore-like depressions; dactyli covered with a velvety coating of minute, golden brown setae which is transversed longitudinally on the outer and inner sides by a narrow, naked line.

SYNONYMY.—*Cancer princeps* HERBST, Natur. Krabben u. Krebse, vol. 2, p. 154, pl. 38, fig. 2, 1794.

Calappa angustata Fabricius, Entom. Syst. Suppl., p. 347, 1798.

Hepatus fasciatus Latreille, Hist. Nat. Crust., vol. V, p. 388, 1803.

Hepatus princeps Rathbun, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 86, 1901; Ann. Inst. Jamaica, vol. 1, pt. 1, p. 38, 1897.

Hepatulus princeps Fowler, Ann. Report N. J. State Museum, vol. for 1911, part I, p. 590, issued 1912.

Family: CALAPPIDAE.

Genus: CALAPPA Fabricius.

Calappa flammea (Herbst).

Plate 14.

Name: Flame streaked box crab.

Diagnostic characters: Body and upper surfaces of chelipeds marked with radiating bands of purplish flame color on a creamy background, the lines converging toward the frontal region. Posterior angles of carapace produced into a wing-like expansion armed with seven teeth; anterior region convex paved with flat granules. Hepatic and branchial regions not well separated.

Type: Herbst's type is recorded as having come from the "East Indies" and, if still existing, is probably deposited in the Berlin Museum.

Distribution: Known from North Carolina southward through the Bermudas and the West Indian region to the eastern shores of Colombia and Venezuela. Littoral.

Material examined: One male dredged in 7 fms., sandy bottom, Bury Islands, Bahamas, B. W. I., January 19, 1925; one male dredged in 3 fms., Bimini, B. W. I., by the "*Ara*," William K. Vanderbilt, commanding.

Technical description: Carapace strongly convex, the frontolateral margin broadly rounded, crenulate and granulate, the posterolateral angles produced into a winglike expansion each armed with seven teeth, of which the postlateral is strongest, the three anterior to it being well developed, triangulate, the second and third with the anterior border slightly longer than the posterior; on the postlateral margin this condition is reversed, the three teeth are weak and successively decrease in size posteriorly; in fact, the second and third teeth

Calappa flammea (Herbst), male, about three-fourths of natural size.

are very slightly incised. The length of the carapace in the median line is 83 mm., the maximum width, from tip to tip of the last antero-lateral spine is 129 mm., the width of the body in the median line is 108 mm. The anterior three-fourths of the upper surface of the carapace, the wing-like projection of the meral joint of the chelipeds, the upper part of the outer face of the carpus, and the upper outer face of the wing-like expansion of the palm are paved with coarse, round, flattish granules, which occasionally form well separated, longitudinal rows of flattish granules or tubercles on the posterior part of the carapace, granules are also present but are much more widely scattered; a series of them form a midrib running diagonally in upon the carapace from the apex of the postlateral tooth and of each two adjacent teeth on either side. The margins of the seven teeth of the wing-like expansion and the posterior margin is coarsely beaded. The frontal margin is narrow, two blunt, subtriangular teeth separated by a wide, shallow U. The superior orbital margin is marked by two closed sinuses. The regions of the carapace are very indistinctly defined except that the uro-cardiac are separated from the branchial by a well-defined, longitudinal depression on each side. The pterygostomian region is densely hirsute. The male abdominal belt is triangulate, the third to fifth segments inclusive fused into one; the distal segment forming a exceedingly tapered triangle.

The male chelipeds are equal except that one has a large, sub-basal node on each the upper and lower fingers. The merus is produced at the distal end into a flaring, cuff-like expansion which is cut into four large, acute, triangulate teeth, each with beaded edge and acute tip. The proximal two are heavily fringed with long, closed setae; the four teeth successively increase in size from proximal to distal and in line with the latter on the lower margin of the propodus there is a beaded, triangulate, sub-basal tooth; the carpus has the upper surface convex, granular, the upper margin straight, a single tooth at the upper distal angle; the propodi are high, crested above, the fingers distinctly deflected and they and the lower part of the palm are paved with very large granules which also bead the lower margin. There are a number of coarse flattish tubercles on the median and upper parts of the outer face of the palm; the upper crest or margin is cut into eight or nine distinct teeth, which increase in height from the proximal to the seventh tooth; the right cheliped has a large sub-basal node or tooth much on its outer side, and the related upper finger has a long, large tooth or lobe which interfits upon that of the

lower finger; there is also a rounded, laminate, sub-basal crest on the upper margin of this finger, beyond which the margin is coarsely beaded. There is a distinct crescentic gape between these fingers, the upper of which has its cutting edge smooth; the lower finger has three or four teeth, the tips interlock. The fingers of the left cheliped do not gape and lack the huge node projections; the upper finger is slenderer and has eight teeth, the lower finger has seven, in addition to the tip.

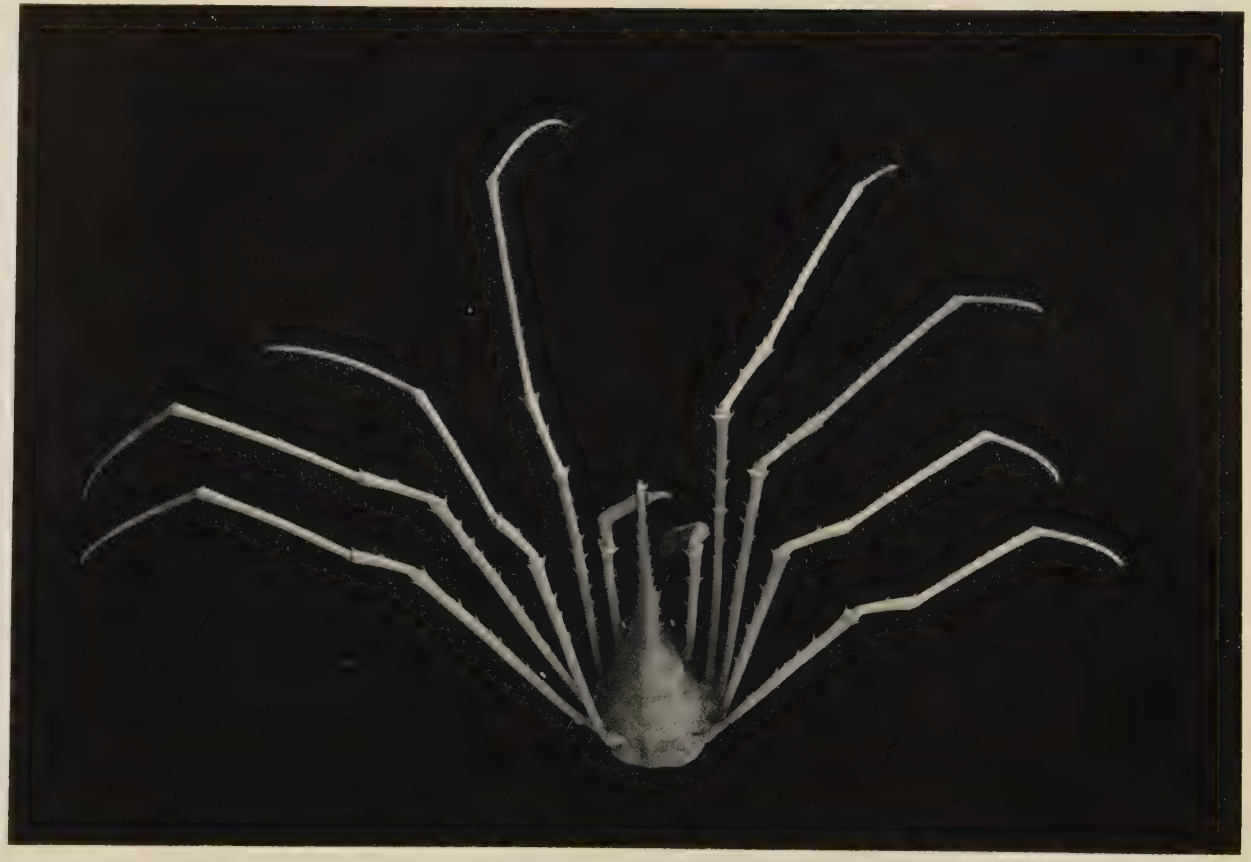
The ambulatories are slender, laterally compressed, the meral joint dilated, much wider than the succeeding joints; the dactyli are tapering, acuminate, with several longitudinal grooves on the lateral faces. When folded, the legs fit beneath the box-like cavity formed by the wing-like expansion of the carapace and cheliped.

SYNONYMY.—*Cancer flammea* HERBST, Natur. Krabben u. Krebse, vol. 2, p. 161, pl. 40, fig. 2, 1793.

Calappa flammea BOSC, Hist. Nat. Crust., vol. 1, p. 185, 1802.—WHITE, List Crust. British Museum, p. 44, 1847.—MIERS, *"Challenger"* Report Zoöl., vol. 17, p. 284, pl. 23, fig. 1, 1886.—RATHBUN, Ann. Inst. Jamaica, vol. 1, No. 1, p. 36, 1897; State Univ. Iowa Bull. Labr. Nat. Hist., vol. 4, p. 289, 1896; Amer. Nat., vol. 34, p. 516, 1900; Bull. U. S. Fish Comm., vol. 20, part 2, p. 84, 1901; Occas. Papers Boston Soc. Nat. Hist., vol. 7, p. 13, 1905.—RANKIN, Ann. N. Y. Acad. Sci., vol. 12, p. 521, 1900.—FOWLER, Crustacea, Report N. J. State Museum, p. 391, 1911 (issued 1912).—VERRILL, Trans. Conn. Acad. Sci., vol. 13, p. 420, pl. 25, fig. 1, 1913.—RATHBUN, Rapport betreffende een vooloopig onderzock naar den toestand van de visscherij en de industrie van zeeproducten in de kolonie Curacao, vol. 1, p. 331, 1901.

Calappa marmorata LATREILLE, Hist. Nat. Crust., vol. 5, p. 391, 1803.—DESMAREST, Consid. Sur les Crust, p. 109, 1825.—H. MILNE EDWARDS, Hist. Nat. Crust., vol. 2, p. 114, 1837.—GIBBES, Proc. Amer. Assoc. Adv. Sci., p. 183, 1850.—KINGSLEY, Proc. Acad. Nat. Sci. Phila. for 1878, p. 324.—S. I. SMITH, Trans. Conn. Acad. Nat. Sci., vol. 4, p. 263, 1880; Ann. Rept. U. S. Com. Fish and Fisheries for 1885, p. 31, 1886.

Calappa granulata DE HAAN, in VON SIEBOLD, Crust. Fauna Japonica, dec. III, p. 70, 1837.



Stenorynchus seticornis Lamarck, female, natural size.

Subtribe: **BRACHYGNATHA.**

Superfamily: **Oxyrhyncha.**

Family: **Majidae.**

Subfamily: **Inachinae.**

Genus: **STENORYNCHUS** Lamarck.

Stenorynchus seticornis (Herbst).

Plates 15 and 16.

NAMES: Arrow crab; Arana del mar.

DIAGNOSTIC CHARACTERS: Rostrum much longer than carapace in adults. Carapace not pubescent; palm much longer than fingers; basal antennal article without spine at extremity.

TYPE: Herbst described *Cancer seticornis* in 1788 after Slabber, who stated that it came from the East Indies. I have not been able to ascertain the repository of Herbst's type specimen; most of his types are in the Berlin Museum. The type-locality of Fabricius' *Cancer sagittarius* is Guadeloupe; specimens believed to be these types are in the Copenhagen Museum, labelled *"Cancer sagittarius,"* and in the Kiel Museum, labelled *"Inachus sagittarius."*

DISTRIBUTION: This species, which is usually taken in moderate depths, has been taken from the shore-line to 814 fathoms. It is known from the mouth of the Chesapeake Bay southward to Key West, Florida, along the west coast of Florida; south of Mobile Bay, Alabama; Cuba; Porto Rico; Bahamas; Jamaica; Bermuda; Yucatan Channel; the Virgin Islands; Curaçao; Colombia; Brazil as far south as Rio de Janeiro. Other records indicate its presence in the Atlantic off West Africa, and in the Mediterranean Sea but these are probably a confusion with *Stenorychus longirostris* Fabricius.

MATERIAL EXAMINED: Five males and one ovigerous female, taken at Porto Padre, Cuba, March 4, 1926, with dragnet in 10 feet of water; four very large males and one female dredged in 70 fms., southwest of Marquesas Keys, Florida, March 2, 1924.

COLOR: The body is creamy buff with four pairs of chestnut brown margined with white bands diverging from the anterior part of the median line to the posterior margin, simulating a series of superim-

posed triangles; the chelipeds and legs are reddish orange, the spines of the rostrum and legs very red, the fingers of the chelae blue to purple.

TECHNICAL DESCRIPTION: Carapace triangular, longer than broad, smooth, not at all, or in old specimens, very slightly pubescent. Rostrum very slender, flattened, horizontal, tapering gently to an acuminate point, varying in length from one and one-quarter to two and three-quarters times the length of the carapace; the lateral spinules of the rostrum point obliquely forward. There is no spine at the distal end of the basal antennal article, which fact separates the present species from *S. debilis* S. I. Smith, the West Coast form, but there is present in *seticornis* at the middle of the basal antennal article a strong spine pointing downward and forward. The abdomen in the male is tapering, somewhat T-shaped, six-segmented, while in the female it is broadly ovate, covering the sternal plastron between the legs, convex and seven-segmented. The male chelipeds have the palm from two to nearly four times as long as the fingers; the distal half of the palm and basal half of the fingers is furry. The chelipeds and legs are very long, slender, finely spinulose and also armed; there are two rows of spines of the merus and several similar spines on the carpus.

SYNONYMY.—*Oost-Indische Zee Krabbe* SLABBER, Naturkundige Verlustigingen, Haarlem, p. 162, pl. 18, fig. 2, 1778.

Arana PARRA, Descripcion de diferentes piezas de historia natural, p. 162, pl. 56, fig. 3, 1787.

Cancer seticornis HERBST, Natur. Krabben u. Krebse, vol. 1, p. 229, pl. 16, fig. 91 (after Slabber); vol. 3, part 3, p. 27, pl. 55, fig. 2, 1803.—OLIVIER, Encyc. Méth. Hist. Nat. Entom., vol. 6, p. 178, 1791.

Cancer sagittarius FABRICIUS, Entom. Syst. emend. et auct., vol. 2, p. 442 (part), 1793.

Inachus sagittarius FABRICIUS, Suppl. Ent. Syst., p. 359, 1798.

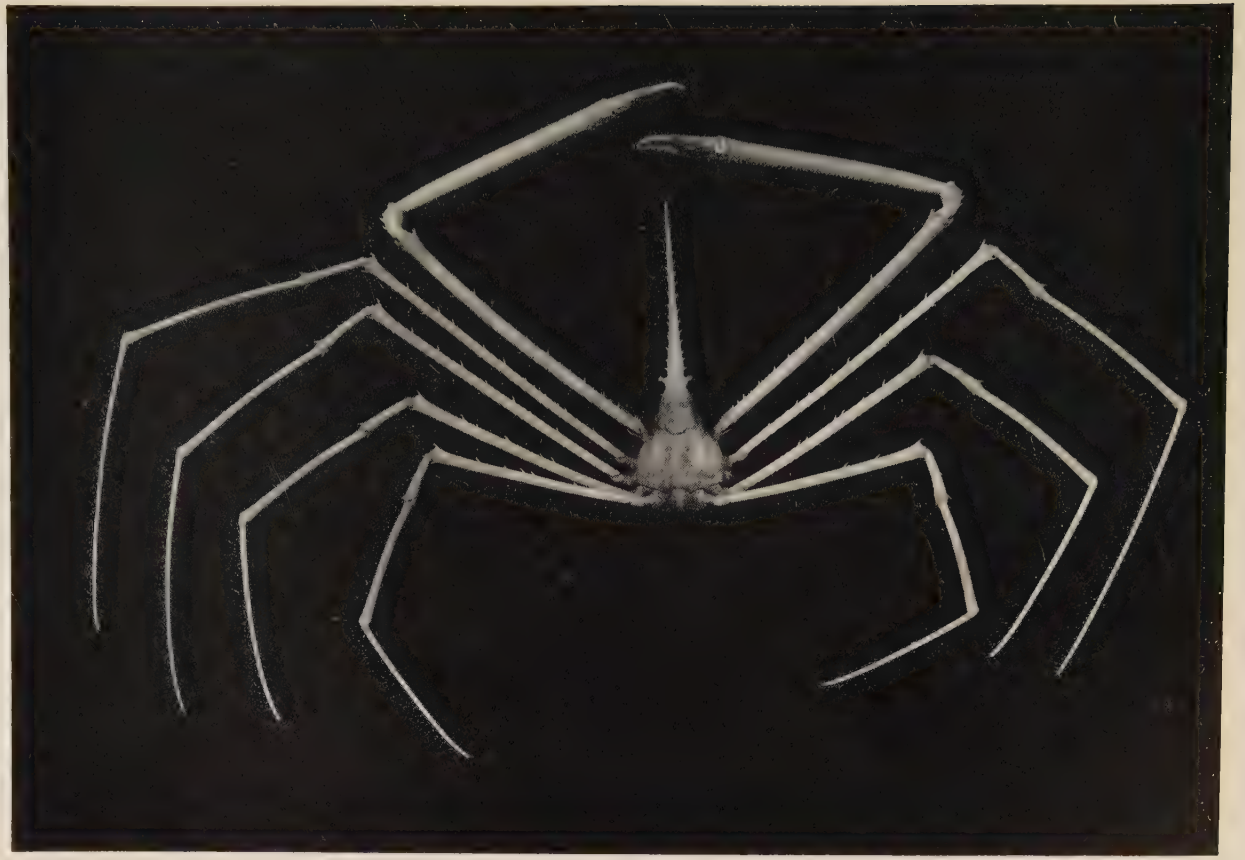
Cancer sagittarius TURTON, Linn. Syst. Nat., vol. 3, p. 738, 1800.

Maja sagittarius BOSC, Hist. Nat. Crust., vol. 1, p. 253, 1802.

Maja seticornis BOSC, *ibid.*, p. 255, pl. 7, fig. 2 (after Slabber), 1802.

Macropus seticornis LATREILLE, Hist. Nat. Crust., vol. 6, p. 111, pl. 49, fig. 3 (after Slabber), 1803.

Macropus sagittarius LATREILLE, *ibid,* p. 112.



Stenorynchus seticornis (Herbst) male, natural size.

Maja sagittaria LATREILLE, Gen. Crust., vol. 1, p. 38, 1806.

Maia sagittaria LEACH, Edinburgh Encyc., vol. 7, p. 395, 1814.

Leptopodia sagittaria LEACH, Zoöl. Misc., vol. 2, p. 16, pl. 67, 1815.—MILNE EDWARDS, CUVIER'S Règne Anim., Disciples Ed., Crust., pl. 36, 1836-49.—BRULLÉ, in WEBB and BERTHOLET'S Hist. Nat. Iles Canaries, vol. 2, Entom., p. 15, 1840.—A. MILNE EDWARDS, Crust. Rég. Mex., p. 172, 1878; Bull. Mus. Comp. Zoöl., vol. 8, p. 6, 1880.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 383, 1879 (1880).—AURIVILLIUS, K. Svenska Vet. Akad. Handl., vol. 23, p. 32, pl. 4, fig. 6, 1889.—OSORIO, Jorn. Sci. Math. Phys. e Nat., Ser. 2, vol. 5, pp. 185, 187 and 192, 1898.—GUNDLACH and TORRALBAS, An. Acad. Habana, vol. 36, p. 298, 1899 (1900) reprint 1917, p. 9.—A. MILNE EDWARDS and BOUVIER, Exped. Sci. Travailleur et Talisman, Crust. Déc., p. 153, pt. 1, 1900.

Macropodia sagittaria LATREILLE, Nouv. Dict. Hist. Nat., vol. 18, p. 355, 1817.—GUNDLACH and TORRALBAS, An. Acad. Habana, vol. 36, p. 297, text fig., 1899 (1900); reprint, p. 10, pl. 1, fig. 1, 1917.

Maja seticornis LATREILLE, Tableau Encyc. Méth., part 24, pl. 281, fig. 5 (after Slabber), 1818.

Stenorynchus seticornis LAMARCK, Hist. Nat. Anim. sans Vert., vol. 5, p. 237, 1818; ed. 2, vol. 5, p. 424, 1838.

Leptopodia ornata GUILDING, Trans. Linn. Soc. London, vol. 14, p. 335, 1825(?).

Letopodia canariensis BRULLÉ, in WEBB and BERTHOLET'S Hist. Nat. Iles Canaries, vol. 2, Entom. plate "Crustacées," figs. 1-1b, 1840.

Leptopodia lanceolata BRULLÉ, *ibid.*

Leptopodia sagittarius HERKLOTS, Symbolae Carcinologicae, Leyden, p. 23, 1861.

Leptopodia vittata GUÉRIN, in KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 384, 1879 (1880).

Leptopodia lineata GOLDI, Arch. f. Naturg., vol. 52, pt. 1, p. 37, pl. 3, figs. 24-31, 1886.

Stenorynchus sagittarius RATHBUN, Ann. Inst. Jamaica, vol. 1, p. 4, 1897; Proc. U. S. Nat. Mus., vol. 22, p. 293, 1900; Bull. U. S. Fish. Comm., vol. 20, pt. for 1900, p. 53, 1901.—HAY and SHORE, Bull. U. S. Bur. Fish., vol. 35, p. 435, 1918.—VERRILL, Trans. Acad. Sci., vol. 10, p. 577, 1900; vol. 13, p. 397, 1908.—RATHBUN,

Bijdragen tot de Dierkunde, Natura Artis Magistra Aflev. 23, p. 18, 1924.

Stenorynchus seticornis RATHBUN, Bull. 129, U. S. Nat. Mus., p. 13, pls. 2 and 3, 1925.

Stenorhynchus longirostris (Fabricius).

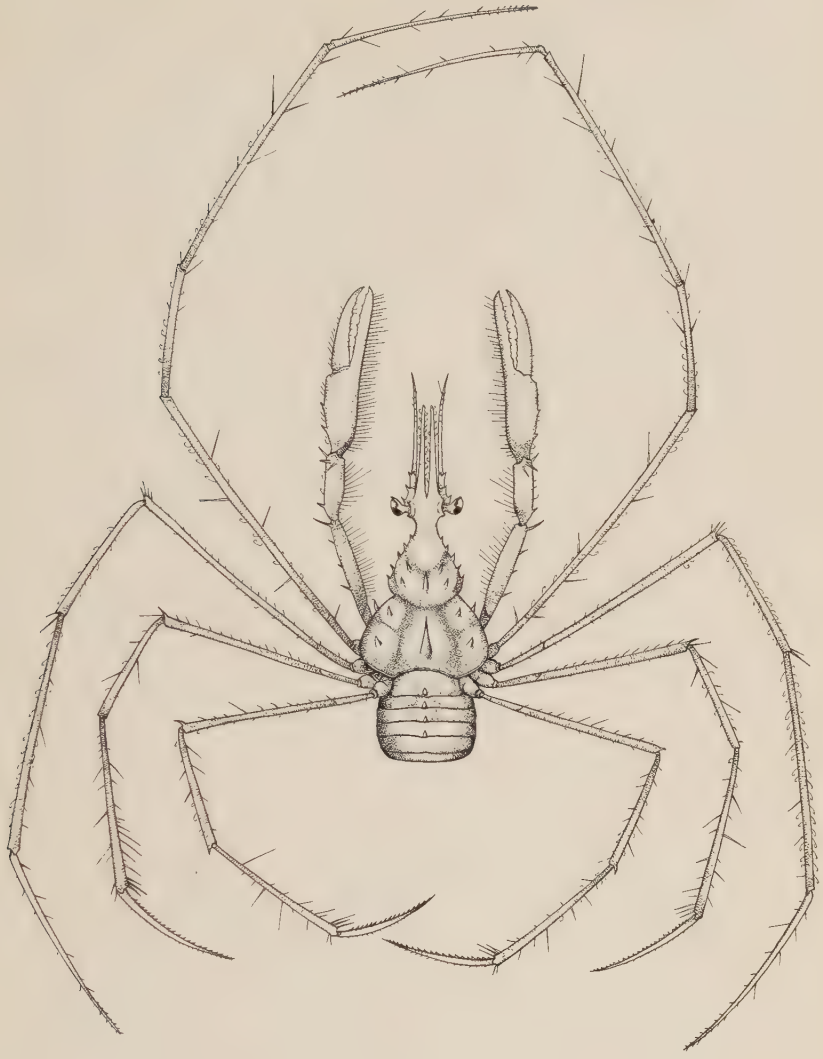
Plate 17.

TYPE: Fabricius' type came from the Mediterranean Sea.

DISTRIBUTION: Known from the Gulf of Gascogne, the Canaries and Cape Verde Islands and from the Mediterranean Sea.

MATERIAL EXAMINED: One specimen taken in dredge in the Adriatic Sea, by the *"Ara."*

TECHNICAL DESCRIPTION: Female—Carapace narrowly triangular, widest posteriorly; rostrum only two-thirds as long as the carapace, composed of two slender horns so closely applied to each other that they appear as one horn with a median groove, until placed under the microscope. The rostrum is distinctly upcurved and is furnished with many little hooked setae. The antennae lay one on either side of the rostrum; the basal article is short, armed on its inferior distal extremity with a spine; the second article is a trifle longer and slenderer than the first and is similarly armed with a spine; the third article is four times as long as the second, or about one-half as long as the rostrum; the flagellum is a third longer than the last peduncular article and is coarsely multiarticulate, extending one-third of its length beyond the rostrum. The superior orbital margin forms a rim around the eye, which latter is protruded on a long stalk and has an elliptical, oval cornea. The gastric region is well separated from the cardiac by a transverse depression which also crosses the branchial region. There is a single very sharp, up-pointing spine on the summit of the gastric region in the median line and posterior to it on the summit of the cardio-intestinal region is a similar long spine; there is a small, acute, out-pointing spine on the hepatic region and posterior to this three others along the lateral branchial margin. Anterior to and outside of the large gastric spine there are a pair of sharp, upward directed spines, one on each side; still farther outside and in line with the largest spine are another pair of short, sharp spines on the gastric region. Three short, sharp spines define a triangle on the postero-



Stenorynchus longirostris (Fabricius). Male. ×1.2.

branchial region. The first, second, third, fourth and fifth abdominal segments in the female each have a median spine, that on the fifth segment being less developed than the others; on the sixth segment there is a very slight median elevation; the sixth and seventh segments are entirely fused.

The external maxilliped has the ischial and meral joints of about equal length along the outer margin; the ischial joint is narrow basally, widening distally, with the outer margin rounded, the inner distal angle decidedly produced into a protuberant lobe; the merus is narrowed distally and proximally with its inner lateral margin convex and spinulose, not excavated at the inner distal angle for the palp which is well developed, three-jointed and setiferous.

The chelipeds have the ischial, meral, carpal, and propodal joints spinulose on both upper and lower margins; the merus is elongate and has one very long spine on its upper distal margin; the carpus has one long, sub-basal spine and two at its upper distal margin; the hand is high, compressed, with a median longitudinal groove on its outer face; the fingers are slightly longer than the palm and very curved inward; the cutting edges meet and are finely denticulate.

The ambulatories are exceedingly slender and long.

SYNONYMY.—*Cancer longirostris* FABRICIUS, Syst., Entom., p. 408, No. 42 (part), 1775.

Inachus longirostris FABRICIUS, Suppl., p. 358, 1798, tome 8.

Macroprus longirostris LATREILLE, Hist. Nat. des Crust., p. 110, 1802.

Macropodia longirostris RISSO, Hist. nat. de l'Europe merid., t. V, p. 27, 1826.

Stenorhynchus longirostris H. MILNE EDWARDS, Hist. Nat. des Crust., t. I, p. 280, 1834.—J. BONNIER, Catal. des Crust. de Concarneau, p. 8, 1887 (and synonymy).—A. MILNE EDWARDS et BOUVIER, E. L,. Result. des Camp. scient. de l'"Hirondelle" (suppl.) et de la "Princess Alice," fasc. XIII, p. 48, 1899; Exped. du Travailleur et du Talisman, Décapodes, p. 156, pl. 22, fig. 6, 1900.

Macropodia (Stenorhynchus) rostrata O. PESTA, Die Decapodenfauna der Adria, p. 318, fig. 99, 1918.

Stenorhynchus tenuirostris BELL, Brit. Stalk-eyed Crust., p. 6, and figure, 1853.

Macropodia tenuirostris LEACH, Edinb. Encycl., t. VII, p. 395 et 431, 1814.

Genus: **INACHUS** Fabricius.

Inachnus dorsettensis (Pennant).

Plate 18.

NAME: Derived from the type locality.

TYPE: Pennant's type specimens came from Weymouth and were originally deposited in the Portland Cabinet.

DISTRIBUTION: From the Norwegian seas, the British Isles and southward on the west European coast, also in the Mediterranean Sea and Adriatic Sea.

MATERIAL EXAMINED: One male infested with *Sacculina neglecta* (Fraissé), dredged in 325 fms., 38 miles S. E. ½ E. of Cape Spartivento, Island of Sardinia, July 22, 1927. One specimen dredged in 100 fms., 9½ miles E. by S., ½ S., of Cape Bon Tunis, North Africa, July 19, 1927.

TECHNICAL DESCRIPTION: Carapace triangulate, rostrum short, bifid, with a deep median groove on the upper surface; orbital margin rim-like; postorbital angle an acute, triangulate tooth. Hepatic, gastric, branchial and cardiac regions well separated by deep depressions. Hepatic lobe produced to a sharp tooth on the lateral margin; there are one or two small, sharp spines on the pterygostomian region; the gastric lobe is much elevated with a broad, transverse row of four spines across the anterior part, one pair of these being submedian, the outer pair being one each on the summit of the lateral gastric lobe; posterior to this the summit of the gastric lobe is produced to one very acute, up-pointing spine in the median line. There is a similar long spine on the summit of the cardiac region and approximately in line with this on either side on the summit of the branchial region is a similar long spine; behind these branchial spines placed just above the posterior margin is an eminence on the intestinal region.

The male chelipeds are very massive, twice or more than twice as long as the carapace with the merus and carpus spinulose on the upper and outer surfaces; the palm is greatly swollen, relatively smooth, the fingers nearly as long as the palm and decidedly incurved.

The ambulatories are exceedingly long and slender, with long dactyli. The first ambulatories are much longer than the chelipeds.

The basal antennal segment has a granulose tooth at its outer distal angle.

Inachus dorsettensis (Pennant), natural size.

Podochela riisei Stimpson, × 2.

The external maxillipeds have the ischium much longer and distinctly wider than the merus and the inner distal angle produced into a rounded lobe which projects almost as far forward as the inner distal angle of the merus; the merus has its inner lateral margin rounded a little and is more oblique than excavate across the inner margin for the reception of the palpi.

SYNONYMY.—*Cancer dorsettensis* PENNANT, Brit. Zoöl., vol. IV, p. 10, fig. 1, 1777.

Inachus dorsettensis LEACH, Malac. Podophth. Brit., pl. 22, figs. 1-6, 1815.—J. BONNIER, Catal. des Crust. de Concarneau, p. 12, 1887 and synonymy).—A. MILNE EDWARDS and BOUVIER, E. L., Result. des Camp Scient. de l'"Hirondelle" (Supplement) et de la "Princess Alice," Fasc. XIII, p. 45, 1899; Exped. Sci. Travailleur et du Talisman Crust. Décap., part 1, p. 143, 1900.—O. PESTA, Die Decapoden Fauna der Adria, 1918, p. 321 and very full synonymy.

Cancer scorpio FABRICIUS, Entom. Syst., t. II, p. 462, 1793.

Inachus scorpio FABRICIUS, Entom. Suppl., p. 358, 1798.

Maia scorpio BOSC., Hist. nat des Crust., t. I, p. 352, 1802.

Macropus scorpio LATREILLE, Hist. Nat. des Crust., t. VI, p. 109, 1803.

Genus: **PODOCHELA** Stimpson.

Podochela riisei Stimpson.

Plate 19.

NAME: This species was named for a Mr. Riis, a Danish gentleman associated with governmental work of the Danish West Indies, who collected many new and rare forms of the West Indian fauna.

DIAGNOSTIC CHARACTERS: Carapace roughly triangulate, rostrum rounded, with a median dorsal carina; one hepatic tubercle; two gastric, and one cardiac. Propodi of leg unequal, that of second leg two and one-half times as long as related dactyl. Dactyli falcate.

TYPE: The type was collected in St. Thomas, Virgin Islands, but it is no longer extant.

DISTRIBUTION: A rather abundant species from shallow water down to 50 fms., from Beaufort, N. C., to the Florida Keys; also taken in Bermuda, the Bahamas, Cuba, Jamaica, Porto Rico, St. Thomas, and

Brazil at Rio de Janeiro. The *"Ara"* specimen from 50 fms. establishes the maximum depth from which this species is known, 30 fms. having been hitherto the greatest depth from which it has been recorded.

MATERIAL EXAMINED: One male dredged in 15 fms. of water, Bury Island Flats, Bahamas, January 22, 1925; one male from off Knight's Key, Florida, March 29, 1926; one large female dredged in 50 fms., American Shoal, Florida.

TECHNICAL DESCRIPTION: Crab small, body triangulate, rostrum produced into a rounded hood which is hollow beneath and carinated on the median dorsal line; superior orbital margin elevated; hepatic region tumid, produced into an acuminate, downward-pointing tooth; pterygostomian region protuberant with a median tubercle; gastric region separated from the hepatic, elevated, with two median tubercles in the male, one in the female; one large, conical tubercle on the cardiac region; the first, second, third and fourth abdominal segments are produced in the center forming a posteriorly directed node; the fifth, sixth and seventh segments in the female are completely fused, forming a wide, heart-shaped brood pouch which is produced into convex lobes on each side of the vaulted median ridge. The male belt is narrow, segmented. The postlateral angle of the carapace is far back, above the base of the first ambulatories, and is obtuse; the branchial regions are low in comparison to the gastric and cardiac regions. There are a number of clusters of hook-like setae on the upper surface of the carapace, one of the most prominent being a subcrescentic arrangement of setae at the base of the rostrum. The legs are also furnished with these hooked setae and with long, stiff, straight setae whose length is approximately three to four times the width of the supporting leg.

The eyestalk is protruberant, slightly constricted medially, with a tongue-like projection on the upper surface of the cornea, which latter is terminal, hemispherical.

The antennulae are long and fold vertically within the septa beneath the rostral hood.

The antennae have the basal article narrowed anteriorly and are longitudinally bicarinate and channelled; the free articles are elongated, slender, cylindrical; the flagellum is very fine, multiarticulate, setose, not as long as the two free articles of the peduncle.

The external maxilliped has the ischium produced to a decided lobe

at the inner distal angle; the merus is narrowed proximally, widened distally with the distal margin sinuate, excavate at the inner angle for the long, three-jointed palp which folds around the inner margin.

The chelipeds in the old males have the palms much dilated and the fingers gaping; the young males and females have much smaller chelipeds with the palm not dilated, the fingers meeting throughout their length; the ischial and meral joints are each produced into a node at the distal margin of both inner and outer angles, also the palm at its basal angles; the lateral margins of the ischial and meral joints are spinulose and set with a row of long, hooked setae; the palm is scarcely as long as the fingers and is spinulose on its lower margin; the fingers are slender, much incurved distally.

The ambulatories are extremely slender and long; the first pair are much the longest and have the meral joint much stouter than that of any of the other legs; it is approximately two and one-half times the length of the carapace; the carpus and propodus are also elongated; the dactyl is only one-fifth the length of the propodus, acuminate, slenderer and less curved than the dactyli of the other legs; the second, third and fourth pairs of legs successively decrease in length; the second pair are little more than twice the length of the carapace; the third legs are about one and three-fourths times, and the fourth legs about one and one-half times the length of the carapace; the propodi are of unequal length and are noticeably thicker distally and bent upward, the margin facing the dactyli are straight and armed with a series of long, curved spines set in clusters; the distal ends of the propodi are formed into rounded protuberances on the outer face which reinforces the joint with the dactyl; the dactyli are curved, very acuminate; the propodus of the first leg is five times as long as its dactyl; that of the second is two and one-half, of the third two and one-fourth and of the fourth leg, twice as long as its related dactyl.

Synonymy.—*Podochela riisei* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 196, pl. 2, fig. 6, 1860.—Miers, Challenger Rept. Zoöl., vol. 17, p. 11, 1886.—Aurivillius, K. Svensks. Vet.-Akad. Handl., vol. 23, p. 34, pl. 4, fig. 7, 1889.—Rathbun, Proc. U. S. Nat. Mus., vol. 17, p. 48, 1894; Amer. Nat., vol. 34, p. 508, fig. 1, 1900; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 54, 1901; Bull. 129, U. S. Nat. Mus., p. 33, pl. 11, figs. 1 and 2, pl. 208, fig. 2, 1925.—Verrill, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 398, 1908.—Hay and Shore, Bull. U. S. Fish. Bur., vol. 35, p. 453, pl. 37, fig. 9, 1918.

Podochela deflexifrons STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 197, 1860.

Driope falcipoda DESBONNE, in DESBONNE and SCHRAMM, Crust. Guadeloupe, p. 2, 1867.

Podonema riisei STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 126, 1871. —MIERS, Journ. Linn. Soc. London, vol. 14, p. 643, 1879.

Podonema hypoglypha STIMPSON, *ibid.*, p. 127.

Podochela spatulifrons A. MILNE EDWARDS, Crust. Rég. Mex., p. 192, pl. 34, figs. 2-2f, 1879.—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, p. 48, 1894.

Podochela hyphoglypha A. MILNE EDWARDS, *ibid.*, p. 194.—RATHBUN, *ibid.*, p. 49.

Coryrhynchus riisei KINGSLEY, Amer. Nat., vol. 13, p. 585, 1879; Proc. Acad. Nat. Sci. Phila., vol. 31, p. 384, 1879.

Genus: **ANASIMUS** A. Milne Edwards.

Anasimus latus Rathbun.

Plate 20.

DIAGNOSTIC CHARACTERS: Carapace broadly ovate with four median spines; two spines in longitudinal series on the branchial region. Interantennular tooth shallow.

TYPE: Taken at *"Albatross"* station 2378, in the Gulf of Mexico and deposited in the United States National Museum.

DISTRIBUTION: From South Carolina to the Florida Keys; Gulf of Mexico; one record west of Trinidad.

MATERIAL EXAMINED: One male dredged in 70 fms., south of Marquesas Keys, Florida, March 2, 1924.

TECHNICAL DESCRIPTION: Carapace 18 mm. long, 16 mm. maximum width, broadly ovate, convex, with the median region elevated, the frontal part subtriangulate, the lateral and posterior part broadly rounded. The rostrum is short, triangular, with the tip produced into an acute, short, up-tilted spine, carinated medially on the upper surface and with the lateral edges granulose. The basal antennal segment is produced into a sharp tooth at its external distal angle, which is visible dorsally on either side at the base of the rostrum. There is, in addition to this spine, a stocky downward and forward directed

Anasimus latus Rathbun, natural size.

spine on the lower surface in line with the eye; the peduncle does not quite extend to the tip of the rostrum; the flagellum is slightly longer than the peduncle. There is a strong, upward directed spine on the superior orbital margin; the postorbital spine is long, slightly exceeding the eye. There is a row of spines and spinules on the pterygostomian region extending to the antennal base; there is one long spine at the corner of the buccal cavity. The regions of the carapace are clearly delineated by grooves; its surface is paved with unequal granules. There is in the median line two well-separated spines on the gastric region, one on the summit of the cardiac and one on the intestinal region. The first abdominal segment in the male is produced into a posterior pointing, acute, horizontal spine. The anterior of the gastric spines is flanked on either side by two transverse spines and anterior to the outermost one of these is a single larger spine. On the inner part of the branchial region there are three small spines; on the anterolateral margin there are three spines, one hepatic and two branchial, above the cheliped. The sternum of the male is coarsely granulate, as is also the abdominal belt, which is vaulted in the median line. The female abdominal belt it said to have a median tubercle on the third and fourth abdominal segments.

The external maxillipeds have the ischium cleaver-shaped, the outer face with a deep, submedian, logitudinal groove on either side of which it is convex; the inner lateral margin is dentate; the inner distal angle rounded and produced. The merus has the inner distal angle excavate deeply for the reception of the palp; the inner lateral margin below this excavation is a decidedly round lobe.

The antennulae are well developed and fold almost vertically within the fossett.

The chelipeds in the old males are slightly more than twice the length of the carapace; in the young males they are not so long. The ischium, merus and carpus are finely granulate; the merus is elongate, cylindrical; the carpus bulbous; the palm swollen, a little shorter than the fingers, which are decidedly curved inward, with a slight gape proximally.

The ambulatories are extremely long, slender, cylindrical, the merus, carpus and propodus granulose, setiferous; the dactyl very slender, acuminate, furnished on the lateral margins with a long fringe of setae.

SYNONYMY.—*Anasimus latus* RATHBUN, Proc. U. S. Nat. Mus., vol. 17, p. 58, 1894; Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, p. 254, pl. 2, figs. 2 and 5, 1898; Bull. 129, U. S. Nat. Mus., p. 65, pl. 214, 1925.

Genus: **COLLODES** Stimpson.

Collodes granosus Stimpson.

Plate 21, figs. A and B.

NAME: Pearly spider crab.

DIAGNOSTIC CHARACTERS: Small. Male with six dorsal tubercles, *i.e.*, one on the median gastric, one on the cardiac, a submedian pair on the intestinal region, and one on the apex of each branchial region. Female usually with only three median tubercles, *i.e.*, gastric, cardiac and one intestinal. Rostrum subtriangulate, bifid. Male chelipeds elongate, swollen, fingers usually with gape. Female chelipeds small, fingers not gaping. Carapace and ventral surface in both sexes coarsely granulate.

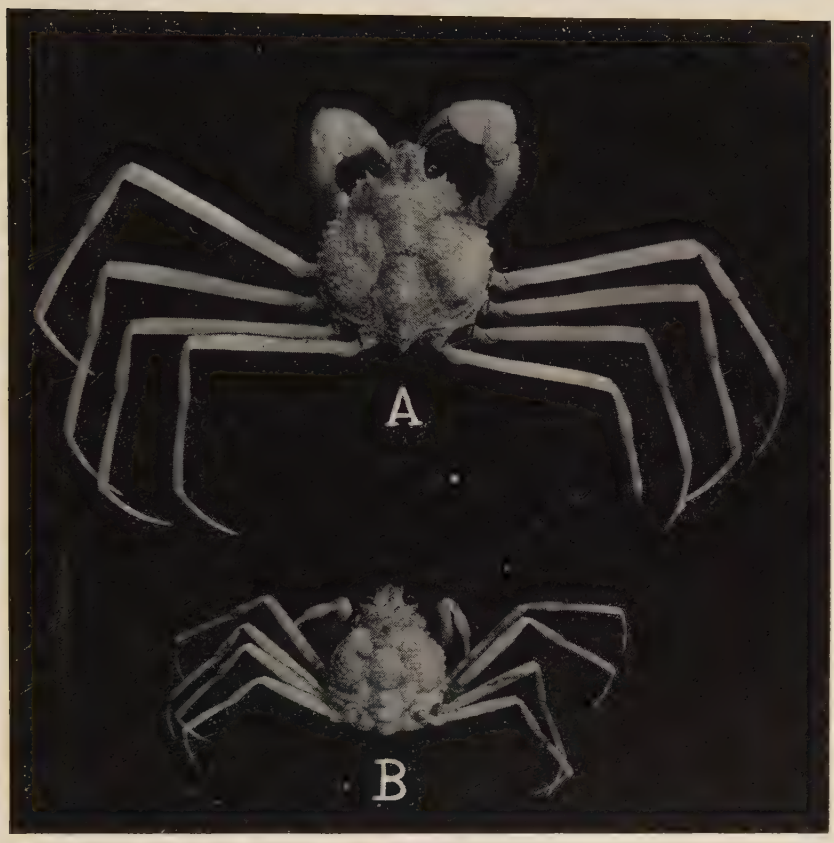
TYPE: The type of this species was taken at Cape St. Lucas, Lower California, and was deposited in the "Museum of the Smithsonian Institution," but like many of their crustacean types, it is no longer extant.

DISTRIBUTION: This species has hitherto been known from only five stations in the Gulf of Lower California, La Paz, San Jose Island, and at Cape St. Lucas, in shallow water. The *"Ara"* material substantially extends the southern range of the species, being its first record from Perlas Islands.

MATERIAL EXAMINED: Three males and two egg-laden females from Perlas Islands, February 19, 1928. One male from Puntas Arenas, Costa Rica, February 14, 1928.

HABITS: This is one of the rare, minute spider crabs of tropical western America. The specimens taken by Mr. Vanderbilt are heavily camouflaged in seaweed and sponges and coated with sediment, making the animal resemble a nodule of mud.

COLOR: The *"Ara"* specimens are a rich cream yellow; the eyes shining black.



Collodes granosus Stimpson, A.—male; B.—female, × 2.

TECHNICAL DESCRIPTION: Carapace pyrifirm, 9.25 mm. long, 6.5 mm. wide, surface nearly devoid of cilia, but covered with large, pearly granules which are much less abundant in the sulci that sharply delimit the regions. Rostrum small, subtriangulate, apex bifid. The superior margin of the eye is delimited, margined with granules, one of which, the median, forms a tubercle. There is also a median tubercle on the gastric, one on the cardiac and a pair, side by side, submedian, on the apex of the intestinal region. The apex of the branchial region also bears a prominent tubercle, and there are two, sometimes three, tubercles on the lateral branchial margin, and two more on the lateral hepatic margin. These lateral tubercles are much enlarged on the male, but on the female they do not appear as tubercles, only as normal granules. The large tubercle present on the apex of the dorsal branchial surface in the male is obsolete in the female, and the paired submedian tubercles of the intestinal region of the male are usually represented by one tubercle on the female, according to Stimpson and Rathbun. However, one of the females taken by the *"Ara"* shows two rudimentary tubercles on the intestinal region.

The male chelipeds are much longer than those of the female and, while slender, have the palm much more swollen; the meral, carpal, and propodal joints are ornamented with longitudinal rows of granules; there is a strong tubercle on the upper distal angle of the ischial joint and the inner and outer upper distal angles of the merus are each tuberculate. The fingers are long, slender, with an elliptical gape; their edges are set with sharp little teeth. The female chelipeds are weak, the palms not swollen, and the long, slender fingers not curved and less gaping. In the male the first pair of ambulatories are exceedingly long, extending beyond the length of the cheliped by the entire length of the long dactyl. The second pair of ambulatories reach only to the base of the propodus of the first pair of ambulatories; the third pair of legs reach only to the base of the propodal joint of the second pair, and the fourth pair of legs are correspondingly shorter than the third pair. In the female the ambulatories similarly decrease in length posteriorly, but the first pair are not so conspicuously elongated as in the male. The male abdominal belt is small, triangulate; both it and the adjacent sternal plate are covered with granules. The female belt is large, subcircular, and covered with large granules. Each of the females captured is carrying from 50 to 60 eggs.

The eyestalks are short, constricted below the cornea, which is large, spherical, blackish brown.

Synonymy.—*Collodes granosus* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 194, pl. 2, fig. 4, 1860 (1862).—A. Milne Edwards, Crust. Rég. Mex., p. 177, 1878.—Rathbun, Proc. U. S. Nat. Mus., vol. 21, p. 569, 1898; Bull. 29, U. S. Nat. Mus., p. 106, fig. 3, pl. 36, figs. 1 and 2, pl. 217, fig. 1, 1925 (females only).

Genus: **DASYGIUS** Rathbun.

Dasygius depressus Bell.

Plate 22.

Diagnostic characters: Carapace very flattish, dorsal surface coarsely granulated and produced posteriorly into a very sharp median, horizontal tooth on the first abdominal segment.

Type: Bell's type was a female taken in the Galapagos Islands, in 6 fms., sandy bottom and deposited in Mr. Bell's private collection, location of which since his death is unknown to the present writer.

Distribution: Galapagos Islands, Perlas Islands and Gulf of California.

Material examined: One female, taken inshore, Wafer Bay, Cocos Island, March 5, 1926.

Color: Old ivory with a pinkish tinge.

Technical description: Carapace flattish, regions definitely delineated; upper surface covered with pearly granulations and an occasional larger one. The rostrum is a single, short, triangulate tooth, the tip blunt, uptilted, the upper surface with the edges thickened, granulose, the center depressed. The external angle of the basal antennal segment forms a tooth similar and subequal to the rostral tooth and almost as prominent dorsally. The superior orbital margin is elevated granulose above the eye, with the outer half flatter, the postorbital tooth blunt. There is a definite groove passing back from the rostrum, circumscribing the gastric region, uniting laterally with the cervical groove which separates the hepatic and branchial regions; there is a deep pit on either side at the urogastric line and a well-defined groove running back to the posterior margin, separating the cardio-intestinal regions from the branchial lobe, which latter has a

Dasygius depressus Bell, female, natural size.

deep curved furrow extending across it the lateral margin. There are one or two rounded tubercles on the hepatic lobe and two on the branchial lobe near the outer margin. The epimeral plates are well developed and are produced into a spine between the first and second, the second and third, the third and fourth ambulatories.

The basal antennal article has its outer margin coarsely granulated, its inner margin armed with two prominent rounded teeth, the upper of which is nearly as large as the third, or distal tooth.

The antennulae fold vertically beneath the rostrum.

The external maxillipeds have the ischium with its outer margin thickened, its inner margin coarsely dentate and produced into a lobe at the inner distal angle; there is a longitudinal groove on the outer face which is also granulose and setiferous; the merus is three-fifths as long as the ischium, with the outer angle slightly rounded laterally and truncated distally, excavate at the inner distal angle for the reception of the antennal palp, and below this excavation produced to a prominent, flaring, rounded lobe; the palp is stocky, with the basal joint enlarged, three-fifths as thick as long.

The female abdominal belt has the first segment dorsally visible, curiously produced into a long, acute, horizontal, conical spine; the second, third and fourth segments are narrow, hinge-like with the median region arched; the fifth and sixth segments are fused, forming a large, circular disc, with a narrow elevated arch extending two-thirds its length, the remaining external surface flat, granular; the seventh segment is small, rounded distally and downbent.

The female chelipeds are small, equal; the ischial and meral joints together form a curved arch around the granulose pterygostomian region; the carpus and propodus are bent downward above the mouth-parts; the propodus is weak, narrow, a trifle distally and is no wider than the merus; the fingers are as long as the hand, tapering, finely denticulated. The male chelipeds are much stouter and have the palm inflated.

The order of length in the ambulatories is 2, 3, 4, 1, the first leg reaching only to midway the propodus of the second leg; the third leg is subequal to the second, and the fourth leg reaches not quite to the tip of the propodus of the third leg. All four legs are dorsoventrally flattened, the upper surface moderately convex, the lateral margins shaggy with long setae.

Synonymy.—*Microrhynchus depressus* Bell, Proc. Zoöl. Soc. London, vol. 3, p. 88, 1835; Trans. Zoöl. Soc. London, vol. 2, p. 42, pl. 8, figs. 2, 2d-f, 1836.

Neorhynchus depressus A. Milne Edwards, Crust. Rég. Mexico, p. 187, 1880.

Dasygius depressus Rathbun, Proc. U. S. Nat. Mus., vol. 21, p. 570, 1898; *ibid.*, vol. 38, p. 571, 1910; Bull. 129, U. S. Nat. Mus., p. 138, pl. 1, pl. 274, figs. 5-8, 1925.—Boone, Zoölogica, N. Y. Zoöl. Soc., VIII, No. 4, p. 136, fig. 37, 1927.

Subfamily: **Pisinae.**

Genus: **HYAS** Leach.

Hyas coarctatus Leach.

Plate 23.

Names: Harper (Leach); toad crab, common name among American fisher-folk.

Diagnostic characters: Carapace lyrate, with the rostrum produced, subtriangulate; the postorbital—hepatic region laterally produced into a laminate expansion with undulating margin, rounded posteriorly. The basal antennal article narrows anteriorly but it without a decided tubercle.

Type: Dr. Leach's type localities are stated as follows: "In *mari Britannico; apud Firth of Forth, Plymouth Sound et Salcombe.*" Dr. Calman of the British Museum staff states that the supposed syntypes of this species with an incomplete label are deposited in this institution.

Distribution: This species is known from the Arctic shores of Europe, Greenland, Iceland, America, Asia; also in the American waters of the Bering Sea and southward to Lat. 56° 10′; from Kamtchatka southward to Korea and Shanghai; on the shores of northern Europe southward to about Lat. 49° 5′ N., and on the eastern American shores down to Cape Hatteras, N. C. Bathymetric occurrence: low water to 373 fms., more rarely at 906 fms.

Material examined: Two females of this typical form were dredged in the upper end of White Haven Harbor, Nova Scotia, September 6, 1926, by the yacht "*Ara,*" William K. Vanderbilt, commanding.

Hyas coarctatus Leach, natural size.

COLOR: Mr. Vanderbilt's notes state that this species is deep olivaceous green with claws orange red.

TECHNICAL DESCRIPTION: Although this species sometimes attains a length of three and one-half inches, the present specimens are much smaller and younger. The carapace is lyrate, with the rostral horns practically contiguous, separated from each other by a narrow, buttonhole-shaped slit, the two horns forming a regular triangle with the upper surface flattish and hirsute; the preorbital margin is rounded, the upper surface bears one well-defined sinus; the postorbital angle is acute; it and the hepatic region are produced into a laminate expansion which has its outer margin rounded posteriorly and is separated from the branchial region by a deep constriction; the lateral margins of the branchial regions are moderately rounded and the posterior margin is also broadly rounded. There is a series of tubercles along the lateral margin terminating before they reach the hepatic region; there are also a number of scattered tubercles on the upper surface of the carapace, an irregular double row running from the rostrum to the intestinal region where they converge and terminate in a single large tubercle; there are two well-seperated larger tubercles in the median line between the two rows on the gastric region. There are also one or two large tubercles on the summit of the branchial region. The upper surface of the carapace and legs is furnished with hooked setae which mostly occur in clusters of five or six. The basal antennal article is narrowed very slightly distally, has the lateral margins much thickened and granulate and the antero-external angle a blunt node; the first free article is rather thickened, granular, with its outer margin dilated; the third article is subcylindric, but a trifle thicker than the flagellum which consists of about twenty articles and extends beyond the rostrum.

The antennulae have an unusually prominent, granulose basal article and a large, subtriangular fossett into which the fleshy flagella fold.

The chelipeds are equal, of moderate size; the merus and carpus elongated, tuberculose on the upper surface, the propodus is moderately robust, the fingers about as long as the hand; there is an approximately median longitudinal groove on the outer face of each finger.

The first ambulatories are as long or a trifle longer than the chelipeds, slender, hairy and beset with many hooked hairs; the dactyli are furred and have acute horn-like tips.

SYNONYMY.—*Hyas coarctatus* LEACH, Trans. Linn. Soc. London, vol. 11, p. 329, 1815; Malacostraca Brit., pl. 21B and text, 1816.—S. I. SMITH, Rept. U. S. Fish. Comm. for 1871-72, vol. 1, p. 548, 1873.—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, p. 69, 1893; in GRENFELL, Labrador, p. 481, 1909; Rept. Canadian Arctic Exped., vol. 7, pt. A, p. 9A, 1919.—BIRULA, Ann. Mus. Zoöl. Acad. Imp. Sci. St. Petersburg, vol. 11, p. 8, 1907.—HANSEN, Danish Ingolf Exped., vol. 3, pt. 2, p. 15, 1908.—DONS, Tromso Mus. Aarshefter 33, p. 158, pl. 1, figs. 14, 19, pl. 2, figs. 9 and 10, 1912-13; pl. 3, figs. 3 to 8, text figs. A2, 4, 6 and 8, B2 and 2a; Aarshefter 37, p. 88, 1914.—RATHBUN, Bull. 129, U. S. N. M., p. 258, pls. 94-95, 1925.

Lissa fissirostra SAY, Journ. Acad. Nat. Sci. Phila., vol. 1, p. 79, 1817.

Hyas coarctata H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 312, 1834; R. Anim. de CUVIER, disciples ed., p. 90, pl. 32, fig. 3.—BIRULA, *ibid.*, p. 445, 1897.

Hyas serratus HAILSTONE, Mag. Nat. Hist., vol. 8, p. 262, 1835.

Hyas bufonis WHITE, List Crust. Brit. Mus., p. 6, 1847.

Hyas coarctatus var. *alutacea* BRANDT, in MIDDENDORDF'S Reise in den Aussersten Norden und Osten Sibiriens, Zoöl., vol. 2, pt. 1, p. 79, 1851.

Hyas latifrons STIMPSON, Proc. Acad. Nat. Sci. Phila., vol. 9, p. 217, 1857.—SMITHSON, Misc. Coll., vol. 49, p. 9, pl. 2, 1907.

Hyas coarctatus var. *latifrons* BRAZNIKOV, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 8, vol. 20, No. 6, p. 43, 1907.

Hyas coarctatus alutaceus BIRULA, *ibid.*, ser. 8, vol. 29, p. 4, pl. 1, figs. 2-5, 1910.

Hyas coarctutus forma alutacea DONS, Tromso Mus. Aarshefter 37, p. 86, footnote, 1915.

Hyas coarctatu ursinus RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, p. 4, 1924.

Genus: **NIBILIA** A. Milne Edwards.

Nibilia antilocapra (Stimpson).

Plate 24, fig. A.

DIAGNOSTIC CHARACTERS: Carapace pyriform, rostrum very prominent, deeply bifurcate. Orbit with a spinous tooth between the preocular and postocular units.

A

B

A.—*Nibilia antilocapra.* B.—*Libinia dubia,* reduced one-half.

TYPE: Prof. Stimpson's type material was taken "off Carysfort Reef, 52 and 60 fms., off Alligator Reef, 118 fms." These types are unfortunately no longer extant.

DISTRIBUTION: Known only from deep water, 52 to 150 fms., this maximum depth having been established by the *"Ara"* specimens. The species ranges from Cape Hatteras, N. C., southward to Florida, the Gulf of Mexico, off St. Vincent and off Barbados.

MATERIAL EXAMINED: One soft-shell male, two small males and one large female, dredged in 150 fms., seven miles off Alligator Reef, Fla.

COLOR: The *"Ara"* specimen was deep red when captured.

TECHNICAL DESCRIPTION: Carapace pyriform, convex, very spinous, rostrum long, horizontal, fused at the base but bifurcated the distal four-fifths of its length; each horn is very acuminate, slightly divergent. The preorbital spine is very long, acute, upward and outward directed; behind it is a shorter, acute spine on the supraocular eave; there is a smaller, triangular tooth between the preocular eave and the postocular cup, which latter terminates in a spine. There is a spine at the angle of the buccal cavity and in line with this is a short spine and a tubercle outside the proximal end of the basal antennal article. The carapace is practically covered with upstanding, acuminate spines of unequal size. The pterygostomian region has two rows of spines. On the hepatic lobe there are several small and two or three long spines; one of these marginal hepatic spines is the longest on the body posterior to the orbital spine. There are about 18 to 20 spines of moderate size with smaller spines interspersed; one of the strongest of these spines occupies the summit of the gastric region and is circled by the smaller spines. On the summit of the cardiac region there is also a long spine surrounded by smaller ones; there are four, long, well-spaced spines on the intestinal region and a row above the posterior margin. The first, second and third segments of the male abdomen each bears three spines. The sternum has no spines and there are none on the maxilliped.

The male chelipeds are elongate, slender; the merus, carpus, and proximal part of the propodus is spinous; the remainder of the hand is practically smooth.

The ambulatories are long, slender, spinous on the merus and carpus; the dactyl is long, stocky, stubby tipped.

The largest *"Ara"* specimen is soft shell, about 70 mm. long, including the rostrum.

Synonymy.—*Pisa antilocapra* Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 110, 1871.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, p. 383, pl. 11, figs. 4 and 5, pl. 12, fig. 3, text fig. 19, 1923.

Pisa praelonga Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 111, 1871. —A. Milne Edwards and Bouvier, Mem. Mus. Com. Zoöl., vol. 47, p. 384, pl. 11, figs. 6 and 7, pl. 12, fig. 4, 1923.

Nibilia erinacea A. Milne Edwards, Crust. Rég. Mexico, p. 133, pl. 25, 1878.

Nibila antilocapra Rathbun, Bull. 129, U. S. Nat. Mus., p. 290, pls. 102, 103 and 239, 1925.

Genus: **LIBINIA** Leach.

Libinia dubia H. Milne Edwards.

Plate 24, fig. B.

Name: This is one of the two species known as the common spider crab of the East Coast of the United States.

Diagnostic characters: Carapace with six median tubercles; dorsal tubercles scarce. One spine situated at the angle of buccal cavity. Carapace more pyriform than *Libinia emarginata.*

Type: H. Milne Edwards gives the type localities as "cotes des Etats-Unis," and states that the type is deposited in the Paris Museum.

Recorded Distribution: Inhabits muddy shores, shallow water to 25 fms. It is very abundant from Cape Cod, Mass., to Texas, and has also been reported occasionally in the upper West Indies. It is recorded from West Africa.

Material examined: Two males, Long Island Sound, Northport, Long Island, N. Y., July 7, 1922; one large male from the same locality, July 7, 1928.

Color: Yellowish to light brick red in young specimens. Frequently covered with mud, algae, anemones, etc.

Technical description: Carapace pyriform and with the rostrum slightly longer and more definitely bifid than in the associated species, *L. emarginata,* which is more nearly hemispherical. Upper surface of carapace very convex, regions sharply delineated; in the median line

there are two spines on the gastric region, the anterior of these is in the center of a transverse row of five small spines; also in the median line there is one spine on the genital, two on the cardiac, and one on the intestinal region. There is one spine at the anterolateral angle of the buccal cavity and five or six on the outer region above the lateral margin of the hepatic and branchial regions, and three other spines forming a triangle on the inner part of the branchial region. The preorbital spine is acute, outward directed, longer than the post-orbital spine which is also acute; there is one closed sinus on the upper orbital margin which bears a tooth at its distal angle. The basal antennal segment bears a tooth at its upper distal angle which is applied to the infero-orbital margin, and another node or tooth at its lower distal angle.

The eyes are small with the upper lateral surface of the cornea protected by a calcareous, tongue-like formation.

The chelipeds are equal in both sexes, larger in the male than in the female, moderately long, slender, the merus is elongated, slenderer basally than distally; the carpus is short and rounded; the male propodus has the palm about as long as the merus, compressed, sub-cylindrical, smooth; the fingers are half as long as the palm, with a slight elliptical gape proximally, the distal two-thirds closing one upon the other, the edges crenulate, tips white.

The ambulatories are long, slender, but strong, with stocky, curved dactyli.

Synonymy.—*Libinia dubia* Milne Edwards, Hist. Nat. Crust., vol. 1, p. 300, pl. 14, *bis*, fig. 2, 1834.—Streets, Proc. Acad. Nat. Sci. Phila., p. 104, 1870.—A. Milne Edwards, Crust. Rég. Mex., p. 129, part, 1878; pl. 18, figs. 5 to 5d, not pl. 26.—Rathbun, Proc. U. S. Nat. Mus., vol. 15, p. 237, pl. 31, fig. 1, 1892.—Hay and Shore, Bull. U. S. Bur. Fish., vol. 35, p. 456, pl. 38, fig. 5, 1918.—Rathbun, Bull. U. S. Bur. Fish., 129, p. 313, pl. 114 and 115, pl. 122, fig. 1, 1925.

Libinia canaliculata DeKay, Crust. of N. Y., p. 2, part , 1844.

Libinia distincta Guérin, La Sagra's Hist. Cuba, vol. 7, pt. 2, Crust. p. xii.—Brito Capello, Jorn. Sci. Lisboa, vol. 3, No. 12, p. 263, pl. 3, fig. 2, 1871.

Libinia subspinosa Streets, Proc. Acad. Nat. Sci. Phila., p. 105, 1870.

Subfamily: **Majinae.**

Genus: **PITHO** Bell.

Pitho aculeata (Gibbes).

Plate 25, figs. A and B.

TYPE: Gibbes' type material came from Key West, Fla., and "Florida" and is said to be no longer extant.

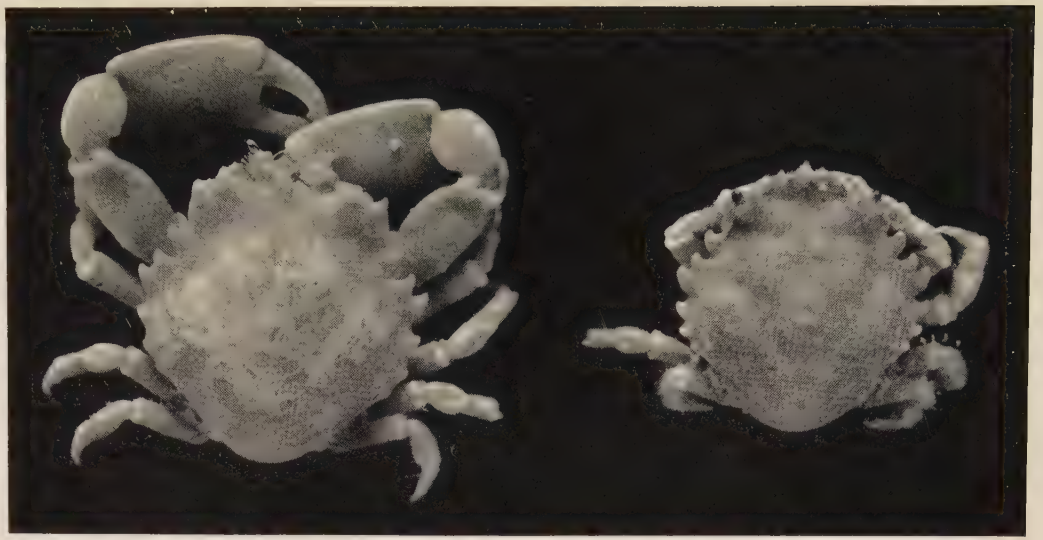
DISTRIBUTION: Bahamas, southern Florida, throughout the West Indies and along the South American coast as far down as Rio de Janeiro, Brazil.

MATERIAL EXAMINED: One specimen from Cardenas, Cuba, March, 1928, collected by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace slightly longer than wide, frontal region wide, rostrum short, bifid; preorbital angle prominent, tooth-like, a decided, closed orbital sulcus; the postorbital angle a large, triangular tooth. There are five teeth on the anterolateral margin; the first is curved, rather hook-like, the second and third are entirely fused basally, the apices curved similar to that of the first; the fourth and fifth teeth are very small, the fifth being sometimes no more than a tubercle. The dorsal surface of the carapace is tuberculous, more so in the young than in the older specimens, which are sometimes nearly smooth. The basal antennal article is wide, the free outer anterior margin denticulate; there is a deep groove between this crest and the frontal border and a second groove on the carapace parallel to the antennal groove. The first movable antennal article has a produced outer lateral lobe.

As shown in the plate, the chelipeds of the old males are enormously larger than those of the females and young male, the latter resembling the female chelae. The old males have the chelipeds about one and one-half times as long as the body; the merus angulate, usually with three lower tubercles on the upper margin; the carpus is marked with a longitudinal crest; the propodus is laterally compressed, smooth; the fingers are widely gaping the distal three-fourths, with a large basal tooth on the dactyl, the finger-tips meeting. The young males and females have the chelae weak, the fingers evenly dentate, meeting.

COLOR: Variable patterns of mottled green and creamy flakes. In some living specimens the green is a deep bottle green, in others it is almost entirely replaced by a brownish olivaceous, in others, yellowish predominates.



Pitho aculeata (Gibbes); the larger specimen is the male, the smaller is a female; both ×1.5.

Pitho anisodon (von Martens), ×1.5. A.—male; B.—female.

SYNONYMY.—*Hyas aculeata* GIBBES, Proc. Amer. Assoc. Adv. Sci., vol. 3, p. 171, 1850.

Othonia aculeata STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 49, 1859; Bull. Mus. Comp. Zoöl., vol. 2, p. 116 (part), 1871.—MIERS, Journ. Linn. Soc. London Zoöl., vol. 14, p. 673, pl. 13, fig. 6, 1879. —KINGSLEY, Proc. Phila. Acad. Nat. Sci., p. 388, part.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, p. 255, pl. 34, figs. 1 and 2, 1892.

Pitho aculeata RATHBUN, Ann. Inst. Jamaica, vol. 1, p. 7, 1897; Bull. U. S. Fish. Comm., vol. 20, part 2, p. 77, for 1900 (issued 1901); Bijdragen tot de Dierkunde, Natura Artis Magistra, Amsterdam, 23E Afl., p. 19, 1924; Bull. 129, U. S. Nat. Mus., p. 357, pl. 127, pl. 251, fig. 1, 1925.

Pitho anisodon (von Martens).

Plate 26.

DIAGNOSTIC CHARACTERS: Carapace shield-shaped, usually a little longer than wide. Anterolateral teeth normally five, besides the orbital, the second and third teeth being united at base, the second tooth always much smaller than the others. Interorbital space narrow. Rostral horns short, subacute in young, separated by a V-shaped sinus, usually bluntly rounded in older forms. First free segment of the antennae with the outer lobe rounded, forward directed. Distal third of male appendages lyre-shaped.

TYPE: Von Martens' type material was collected in Cuba and is deposited in the Berlin Museum.

DISTRIBUTION: Known from many of the Florida Keys, the Bahamas, Cuba, Porto Rico, Guadeloupe, Jamaica and Curaçao.

MATERIAL EXAMINED: Several males and females taken in drag-net, Cardenas, Cuba, March 5, 1928, by the *"Ara."*

COLOR: The specimens taken by the *"Ara"* are olivaceous green mottled with fine whitish markings, also with tiny deep green flecks on the upper surface. The under surface of the body is creamy whitish.

HABITS: Beyond the fact that this species dwells in shallow water, and protects itself by a camouflage of seaweed, sand, sponges, bryozoa, etc., nothing has been recorded of its habits.

TECHNICAL DESCRIPTION: Carapace shield-shaped, convex, about one-fifth longer than wide, except in very large females, which are usually

wider than long, the upper surface ornamented with a few, scattering low flat tubercles from some of which setae arise; cervical groove faintly delineated. Interorbital space narrow, rostral horns subacute and separated by a V-shaped sinus in young specimens; more bluntly rounded and less separated in older specimens. Pre- and postorbital angles blunt, a linear, closed sinus about midway the upper orbital margin; the eye protruding distinctly beyond the carapace. The anterolateral margin is armed with five acute, outward and forward directed teeth; of these, the first, third and fourth are subequal, the second is much reduced and united at the base with the third tooth; the fifth tooth is weaker than the fourth, but is decidedly larger than the second tooth. The fact that there is much individual variation in the second tooth is strongly emphasized by the eleven specimens taken by the *"Ara."* Of these, the three largest, two males and a female, show the dentition ascribed by Miers and Rathbun to *quadridentata.* The males have the second tooth entirely obsolete, while the large female has the second tooth reduced to a rudimentary tubercle on the right side and an almost obsolete tubercle on the left side, while the fourth left tooth has an accessory small, acute tooth at its base on the posterior margin. Another female has both second teeth a rudimentary nodule, but the carapace is longer than wide. The four males, about the same size as the preceding female, has the second tooth larger, united at its base, as in typical *anisodon.* Another female, of the same size as the preceding, has the second teeth rudimentary, nodular, but the remaining teeth very acute as in *anisodon;* two other females of about the same size, has identical *anisodon* dentition, but the body is wider in proportion to its length than in the typical form. Yet another female of about the same general size, except that it is distinctly longer than wide, shows the second tooth on the left side almost as large as the third tooth with which it is united at base, while on the right side the second tooth is reduced to an almost invisible flat node. Another female, large, as wide as long, has the left second tooth represented by a large bluntly rounded node at the base of the third tooth, while the second right tooth is acute, well developed, as in typical *anisodon,* and united at base with the third tooth. The one small male taken at Pilon, Cuba, of about the same size as the majority of the females, has both second teeth acute, as in *anisodon.* The three males show the fourth abdominal segment to have about the same length ratio; it is worthy of note that while Dr. Rathbun states that this segment is

Mithrax (Mithrax) hispidus (Herbst), natural size.

longer in *quadridentata* than in *anisodon,* her photographed specimens fail to show such difference.

SYNONYMY.—*Othonia anisodon* VON MARTENS, Arch. fur Naturgh., vol. 38, part 1, p. 83, pl. 4, fig. 3, 1872.

Othonia aculeata KINGSLEY, Proc. Acad. Nat. Sci. Phila., 1879 (issued 1880), p. 388, part.

Othonia lherminieri RATHBUN (not Schramm), Pros. U. S. Nat. Mus., vol. 15, p. 255, pl. 34, figs. 3 and 4, 1892 (part).

Pitho anisodon RATHBUN, Ann. Inst. Jamaica, vol. 1, art. 1, p. 8, 1897; Bull. Labr. Nat. Hist. State Univ. Iowa, vol. 4, p. 258, 1898; Bull. U. S. Fish. Comm., vol. 20, part 2, p. 77, 1901; Bull. 129, U. S. Nat. Mus., p. 368, pl. 131, pl. 151, fig. 2, text fig. 118, 1925.

Genus: **MITHRAX** Latreille.

Subgenus: **Mithrax** Rathbun.

Mithrax (Mithrax) hispidus (Herbst).

Plate 27.

NAME: Coral crab.

DIAGNOSTIC CHARACTERS: This exquisite crab belongs in the group of *Mithrax,* which have the carapace devoid of oblique branchial sulci. It is readily recognized by the presence of three anterolateral spines, the first of which is bifid, and one postlateral spine; the rostral sinus is U-shaped, subequal to either horn; there are two well-developed spines on the anterior margin of the meral joint of the chelipeds.

TYPE: Herbst failed to cite the locality of his type, which is deposited in the Berlin Museum.

DISTRIBUTION: This species has been sparingly recorded from Delaware Bay by Thomas Say; from off Charleston Harbor, S. C., and off Georgia by Gibbes, which records are quite probably due to stray specimens swept northward by the mighty Gulf Stream. *Mithrax hispidus* is well known on the Florida coast southward from Miami; from the Bahamas, Jamaica, the Bermudas, Curaçao, and from half a dozen localities in Brazil, of which Rio de Janeiro is the southernmost record.

Material examined: One female, trapped in lobster pot, Miami, Florida, in the Bay of Biscayne; one very large male, dredged on the Florida Reefs, 1923, by the *"Ara."* One young female, scarcely one-half inch wide but heavily egg-laden, dredged in 7 fms., Bury Island, Bahamas, January 19, 1925.

Color: The "coral" crab takes its name, not from the fact that it is an inhabitant of the coral reefs, but from the exquisite coloration and sculpturing of its body, which recall the red coral so highly prized by the ancients and used even today as a jewel. The carapace and ambulatories of the crab are coral red with brighter bands of red at the distal joints, ends of the joints and flecks of pale yellow on the upper surface. The chelipeds are likewise brighter, especially in the male specimens. The underparts of the body are bluish. The eyes are black, beadlike.

Habits: *Mithrax hispidus* is chiefly nocturnal, spending the greater part of the daytime quiescent among the coral rocks which it so closely resembles in contour and coloration. It is both carnivorous and herbivorous, feeding on the smaller fishes, crustaceans, worms, etc., and the tender shoots of turtle-grass, sea-lettuce and similar marine plants. For notes of the rate of growth see my report on the "Crustacea from Tropical East American Seas," p. 38.

Technical description: Carapace tumid, one-sixth wider than long, devoid of branchial sulci, smooth except for a few, low, rounded tubercles on the outer branchial region; cervical and urogastric grooves deep; cardiac groove deep in young specimens, shallower in older ones; gastric tubercles well defined in young, nearly obsolete in older specimens. Rostral horns blunt, short, separated by a U-shaped sinus, subequal to either horn. The orbit is surrounded by four unequal spines besides the antennal; of these four, the inner and outer are subequal, obtuse, the others are smaller, more rounded. The larger antennal spine, which slightly exceeds the rostrals in length, is subacute, with tips incurved; the outer, smaller antennal spine is subequal to the inner orbital, and has a small tubercle at its base. There are five spines on the lateral margin, the first is hepatic, obtuse, occasionally bifid, the second spine is decidedly bifid, its posterior point being the longer and forward curved, the third and fourth teeth are longer, slenderer than the second with the tip decidedly curved forward; the fifth tooth is much smaller, postlateral and placed higher upon the carapace. There are two tubercles on the subhepatic region

and a series, some of which are acute, some obtuse, place irregularly on the subbranchial and pterygostomanian regions.

The chelipeds are equal in the females, but are decidedly unequal in the larger males. The merus is armed with five or six strong spines on the outer lateral margin, two or three moderate-sized ones on the upper surface and two to four strong ones on the upper lateral margin; the carpus is short, smooth, convex on the upper and outer surfaces; the propodus (female) is about as long as the carapace, smooth, laterally compressed; the fingers comprise scarcely one-third of the total propodal length, and are slender, subequal, the tips rounded and the inner edge set with a series of fine interfitting teeth.

The ambulatories are similar, successively decreasing posteriorly in length; each has the meral, carpal, and, in a less degree, the propodal joints are armed on the upper edges with a longitudinal series of spines; the propodi and dactyli are covered with a tufting of fine, dense golden setae. The joint of the propodus with the dactyl is reinforced by a projecting rounded end of the propodus extending down upon the outer side of the dactyl. The tip of the dactyl is sharply curved, horn-color, chitinous.

SYNONYMY.—*Cancer hispidus* HERBST, Natur. Krabben u. Krebse, vol. 1, p. 245, pl. 18, fig. 100, 1790.

Maia spini-cincta LAMARCK, Hist. Nat. Anim. sans Vert, vol. 5, p. 241, 1818.

Maja spini-cincta SAY, Journ. Acad. Nat. Sci. Phila., vol. 1, p. 458, 1818.

?Mithrax spinicinctus DESMAREST, Dict. Sci. Nat., vol. 28, p. 264, 1823; Consid. sur les Crust., p. 150, pl. 23, fig. 1, 1825.

Mithrax hispidus H. MILNE EDWARDS, Mag. de Zoöl., vol. 2, cl. 7, p. 13, 1832; Hist. Nat. Crust., vol. 1, p. 322, 1834.—A. MILNE EDWARDS, Crust. Rég. Mex., p. 93, pl. 21, figs. 1-1b, 1875.—MIERS, Journ. Linn. Soc. London Zoöl., vol. 14, p. 673, pl. 13, figs. 7 and 8, 1879.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, p. 265, 1892 (in part).—VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 404, text fig. 40, pl. 23, figs. 3 and 4, pl. 24, fig. 1, 1908.

Mithrax hispidus RATHBUN, Bull. 129, U. S. Nat. Mus., p. 406, pl. 146, 146 and pl. 147, fig. 3, text fig. 124, 1925.—BOONE, Bull. Bingham Oceanog. Coll., vol. 1, part 2, p. 38, 1927.

Mithrax ——— Desbonne and Schramm, Crust. Guadeloupe, p. 8, pl. 2, figs. 4 and 5, 1867.

Mithrax depressus A. Milne Edwards, Crust. Rég. Mex., p. 96, 1875; the specimens from Woman Key, Fla., but not that figured on pl. 20, figs. 4-4c.

Rathbun, Bijdragen tot de Dierkunde, Zoölogisch Genootschap Natura Magistra, Aflev. 23, p. 20, 1924.

Mithrax (Mithrax) pleuracanthus Stimpson.

Plate 28, fig. A.

Name: Little red spider crab. One of several species known as coral spider crab.

Diagnostic characters: Rostral horns shorter and wider than in *Mithrax hispidus* of *M. caribbaeus;* sinus more inclined toward V- than U-shape, especially in young forms. Anterolateral tubercles of carapace four, first three tuberculate, fourth, spiniform; one small postlateral tubercle. Second branchial tubercle small.

Type: Stimpson's type localities are given as Key West, Florida, 2 to 5 fms.; Tortugas, 5 to 6 fms.; St. Thomas, Virgin Islands; the types are no longer extant.

Distribution: This species has been recorded from Beaufort, N. C., off Charleston, S. C., from many points in southern Florida, the Gulf of Mexico, Cuba, Porto Rico, St. Thomas and St. Martin, Curaçao and the Caribbean Sea.

Material examined: One female taken at Cardenas, Cuba, March, 1928, by the *"Ara,"* William K. Vanderbilt, commanding. One egg-bearing female, off Knight's Key, Florida, March 29, 1926. This specimen was yellowish white with many blotches of bright red. (Field-note, W. K. Vanderbilt.) One very small ovigerous female from Port Antonio, Jamaica, 2 fms., with dragnet, February 17, 1926. Two males taken at Cay Sal Bank, near light, double-headed Shot Cay, Bahamas, February 18, 1925.

Color: Bright red, finely reticulated with creamy yellowish, legs predominantly red, barred with narrower bands of yellow, chelipeds bright red, including tips of fingers.

Habits: *Mithrax pleuracanthus* has been found from the shore to a depth of 26 fathoms. It inhabits a coral bottom and protects itself

A.—*Mithrax* (*Mithrax*) *pleuracanthus* Stimpson, ×1.5. B.—*Mithrax* (*Mithrax*) *cornutus* Saussure, ×1.5.

A

B

A.—*Mithrax acuticornis* Stimpson, very young, × 6. B.—*Mithrax* (*Mithrax*) *holderi* Stimpson, × 2.

by dressing its slender, hairy, color-barred legs with fragments of its environment—hydroid, sand grains, bryozoa, etc., rendering the legs exceedingly inconspicuous, while the rugose, pebble-like carapace looks like a bit of coral rock. It moves very rapidly and is difficult to catch as it scuttles into a crevice of the rock when disturbed.

TECHNICAL DESCRIPTIONS: Carapace compressed, pyriform, about as wide as long, areas clearly delineated, rostral horns short and wide, more V- than U-shaped; anterolateral border with four dentitions, the first three of which are tuberculate, the fourth, spiniform; one postlateral tubercle. There are a pair of small submedian tubercles in the frontal region in line with the preorbital angle; behind these are a similar, larger pair of tubercles which in turn are followed by a transverse row of five tubercles in the gastric region; posterior to this row is a single tubercle placed between the horns of a lunate series of rugosities which border the urogastric line. The branchial region is coarsely tuberculated and the cardiac region only a little less so. The chelipeds are a trifle less robust in the female than in the male; the merus of the chelipeds has a single tubercle; the fingers are slightly gaping but meet closely at the tip. The ambulatories are subsimilar, slender, hairy. The specimens which have come under my observation range from 10 to 20 mm. long.

SYNONYMY.—*Mithrax pleuracanthus* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 116, 1871.—A. MILNE EDWARDS, Crust. Rég Mex., p. 95, pl. 20, figs. 3-3f, 1875.—RATHBUN, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 68, 1901; Bull. 129, U. S. Nat. Mus., p. 411, pl. 150, 1925.

Mithrax depressus A. MILNE EDWARDS (part), Crust. Rég. Mex., p. 95, pl. 20, figs. 4-4c, 1875.—RATHBUN, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 68, 1901.

Mithrax hispidus RATHBUN, Proc. U. S. Nat. Mus., vol. 15, p. 265 (part), 1892.

Mithrax (Mithrax) pleuracanthus RATHBUN, Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, Aflev. 23, p. 20, 1924.

Mithrax (Mithrax) acuticornis Stimpson.

Plate 29, fig. A.

NAME: Sharp-horned *Mithrax.*

DIAGNOSTIC CHARACTERS: Small, orange, red, body elongate-pyriform, with spinulose upper surface; four anterolateral spines of which

the first is bifid; each of the others preceded by a short spine; the fourth spine is longest and marks the angle formed by the antero- and postlateral margins; one postlateral spine short. Superior orbital margin with two teeth between the pre- and postorbital angles. Basal antennal segment with three spines; one, small, at base of next joint, a long, obliquely out-directed one at the external angle, and a small one on the inferior orbital margin.

TYPE: Prof. Stimpson's types were taken off the Quicksands, Florida, in 34 fms., and west of Tortugas, 37 and 42 fms., and deposited in the U. S. National Museum, but they are no longer extant.

DISTRIBUTION: Inhabits the deeper waters, off-shore, known from 12 to 45 and more rarely to 163 fathoms. Florida from Miami south and westward in the Keys; the Gulf of Mexico, Yucatan Channel; Porto Rico; Montserrat and Grenadines. The *"Ara"* specimen establishes the first Cuban record for the species.

MATERIAL EXAMINED: One male dredged in Cualo Reales Channel, Cuba, February 18, 1923.

COLOR: In life this spider crab imitates a sponge in coloration, its body being vivid orange red, the fingers are purplish red, with narrow white bands across their bases, according to the field-notes of the late John B. Henderson, 2nd.

TECHNICAL DESCRIPTION: So far as known, this is a small species, seldom exceeding a quarter of a dollar in diameter. The carapace is decidedly longer than broad, elongate pyriform, anterolateral margins long, diverging posteriorly, their union with the postlateral margins angulated; the postlateral margins rounded, converging. There are four spines on the anterolateral margin, the first of which on the hepatic region is double, having a lesser spine on the anterior side; there is also a small spine in front of each of the other anterolateral spines, of which the fourth is longest; the postlateral spine is shorter than the others. The upper surface of the carapace is deeply cleft by the cervical and cardiac grooves and covered with numerous sharp spines, which are slightly less acuminate and less abundant on the gastric region than elsewhere; each spine is tipped with a cluster of upstanding setae. The rostral horns are slender, three-fourths as long as the interorbital width, directed almost straight forward, the tips slightly incurved, acuminate, the horn separated from each other by a V-shaped space, approximately equal to either horn. The basal antennal article has three spines, a small one at the base of the first

movable article, a strong, acuminate, obliquely outward directed one at the external angle which is half as long as the rostrum and a smaller one on the inferior orbital border; the first and second free articles are stocky, subequal, each equivalent to one-third the length of the rostrum, beside which they lay; the flagellum is very slender, about two and one-half times as long as the rostrum, each ring furnished with exceedingly long setae.

The antennulae are fleshy and fold a little obliquely within the fossett.

The eye is exposed, large, convex, brown; a strong fringe of setae surrounds the cornea; the superior orbital margin has, in addition to the pre- and postorbital teeth, two lesser ones, one on each side of the suture line.

The external maxillipeds have the outer distal lobe of the merus produced and broadly rounded.

The chelipeds are strong, slender, reaching beyond the rostrum when extended, the merus has two longitudinal rows of spines on the upper surface; the carpus is very spinous; the propodus in larger specimens has a few spines basally; the fingers have a short gape, the cutting edges crenulate frequently, but not always, with one large sub-basal tooth on the dactyl.

The ambulatories are slender, the first pair as long as the chelipeds, the others decreasing slightly in length, each with two rows of spines on the upper surface of the meral and carpal joints; the dactyl very curved with a sharp tip.

Synonymy.—*Mithrax acuticornis* Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 116, 1870.—A. Milne Edwards, Crust. Rég. Mex., p. 98, 1875.—Rathbun, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 66 part) for 1900 (1901).—A. Milne Edwards and Bouvier, E. L., Mem. Mus. Comp. Zoöl., vol. 47, p. 390, pl. 11, fig. 11, text figs. 22, 23, 1923.—Rathbun, Bull. 129, U. S. Nat. Mus., p. 388, pl. 136, figs. 1 and 2, pl. 257, fig. i, 1925.

Nemausa rostrata Milne Edwards, Crust Rég. Mexico, p. 81, pl. 17, fig. 4, 1875.

Mithrax (Nemausa) acuticornis Rathbun, Proc. U. S. Nat. Mus., vol. 15, p. 260, part, pl. 37, fig. 1, 1892.

Mithrax (Mithrax) acuticornis Stimpson, variety Rathbun, Bijdragen tot de Dierkunde, Artis Magistra te Amsterdam, Aflev. 23, p. 20, 1924.

Mithrax (Mithrax) cornutus Saussure.

Plate 28, fig. B.

NAME: Coral crab; horned spider crab.

DIAGNOSTIC CHARACTERS: Known to attain a length of three to three and one-half inches. Carapace elongate-ovate; rostral horns long; four major anterolateral spines of which the first is trifid, the others, each bifid; one high, postlateral spine. Basal antennal articles with three spines. Orbital margin much cut, as described below.

TYPE: Saussure's type material came from the Antilles and is deposited in the Geneva Museum.

DISTRIBUTION: Florida Straits, 589 fms.; Bermuda; Antilles; off Havana, Cuba, 121 fms.; between Jamaica and Haiti, 52 fms.; Dominica, 40 to 150 fms.; Bahia, Brazil, shallow water; San Salvador, *"Ara"* record.

MATERIAL EXAMINED: Young specimen from Hogsty Key, San Salvador, B. W. I., February 13, 1926, collected by the *"Ara."*

COLOR: Mr. Vanderbilt's notes state that this crab is deep red. Saussure states that it is yellowish or rosy; often rose color. The preserved specimen before me from which, when alive, Mr. Vanderbilt's notes were made now answers to the Saussure description.

TECHNICAL DESCRIPTION: Young specimen. Carapace elongate-ovate, narrower anteriorly; 21 mm. long from base of rostrum to posterior margin; rostrum 9 mm. long; maximum width 17 mm.; upper surface moderately convex, cervical and urogastric grooves deep; a number of small, sharp spines on the upper surface. Rostral horns slender, divergent distally, separated by a wide V-shaped space; orbital margin elongate, much cleft; preorbital tooth long, acute, directed obliquely outward and slightly upward; two small acute, but well separated, spines on the upper margin; the postorbital spine larger than either of these but only three-fourths as long as the preorbital spine; inferior orbital margin with two acute spines in addition to the very long spine arising from the antennal segment. The basal antennal segment has three spines in all; a small spine at the base of the first free article; the very long spine at the external angle, which is directed obliquely outward and forward and is a trifle more than half as long as the rostrum; it is armed on the upper side with two or three spinules; the third antennal spine is one-third as long as the big one and is situated on the orbital border. Prof. Milne Edwards

states that there are three inferior and lateral and three spines on the superior orbital margin in addition to the pre- and postorbital and antennal spines. Miss Rathbun states that one of her specimens has four spines here. The anterolateral margin is armed with four major spines, the first of which, occupying the entire hepatic margin, is trifid, consisting of a long, curved spine with a smaller acute one on either side of it; the second, third and fourth major spines are each bifid, consisting of a long spine with its tip curved forward and anteriorly an acute spine which is only from one-half to two-thirds as long as the major spine; the fourth spine is at the lateral angle; posterior to this and distinctly higher upon the carapace is a single, shorter, postlateral spine. The lateral walls of the carapace are armed with a series of smaller spines.

The chelipeds are subequal; when extended those of the young male reach only a slight distance beyond the tips of the rostrum; the merus is armed with five longitudinal rows of spines, of which the upper two are longest; the carpus is small and very spinous; the propodus is elongate, with two broken rows of spines on the upper surface; the fingers have the tips spoon-shaped, with the edges crenulate.

The ambulatories each have the merus armed on the upper surface with two rows of long spines and two of short spines; the carpus is spinose; the propodus is olongate, subcylindrical, roughened with nodules, produced at its union with the dactyl into a strong, knob-like protrusion which reinforces the joint; the dactyl is long, slender, with a slightly curved, very acuminate tip, and bears numerous long, stiff setae.

SYNONYMY.—*Cangrejo espinosa* PARRA, Descripcion de diferentes piezas de historia natural, p. 127, pl. 47, fig. 1, 1787.

Mithrax cornutus SAUSSURE, Rev. et Mag. Zoöl., ser. 2, vol. 9, p. 501, 1857; Mém. Soc. Phys. Genève, vol. 14, p. 423, 1858.—A. MILNE EDWARDS, Crust. Rég. Mex., p. 97, pl. 22, fig. —, 1875.—MIERS, Challenger Rept. Zoöl., vol. 17, pp. 86, 87, 1886.—VERRILL, Trans. Conn. Arts and Sci., vol. 13, p. 400, 1908.—RATHBUN, Bull 129, U. S. N. M., p. 386, pl. 137, figs. 3 and 4, pl. 256, 1925.

Mithrax (Mithrax) holderi Stimpson.

Plate 29, fig. B.

DIAGNOSTIC CHARACTERS: Carapace pyriform, definitely longer than wide; deep cervical-urogastric groove; surface broken by many areolae and tubercles; postlateral spine, also hepatic spine well defined.

TYPE: Prof. Stimpson's type was taken at Tortugas; it is no longer extant.

DISTRIBUTION: Recorded from the Florida Keys, Cuba, Porto Rico, Jamaica, St. John, V. I., St. Croix.

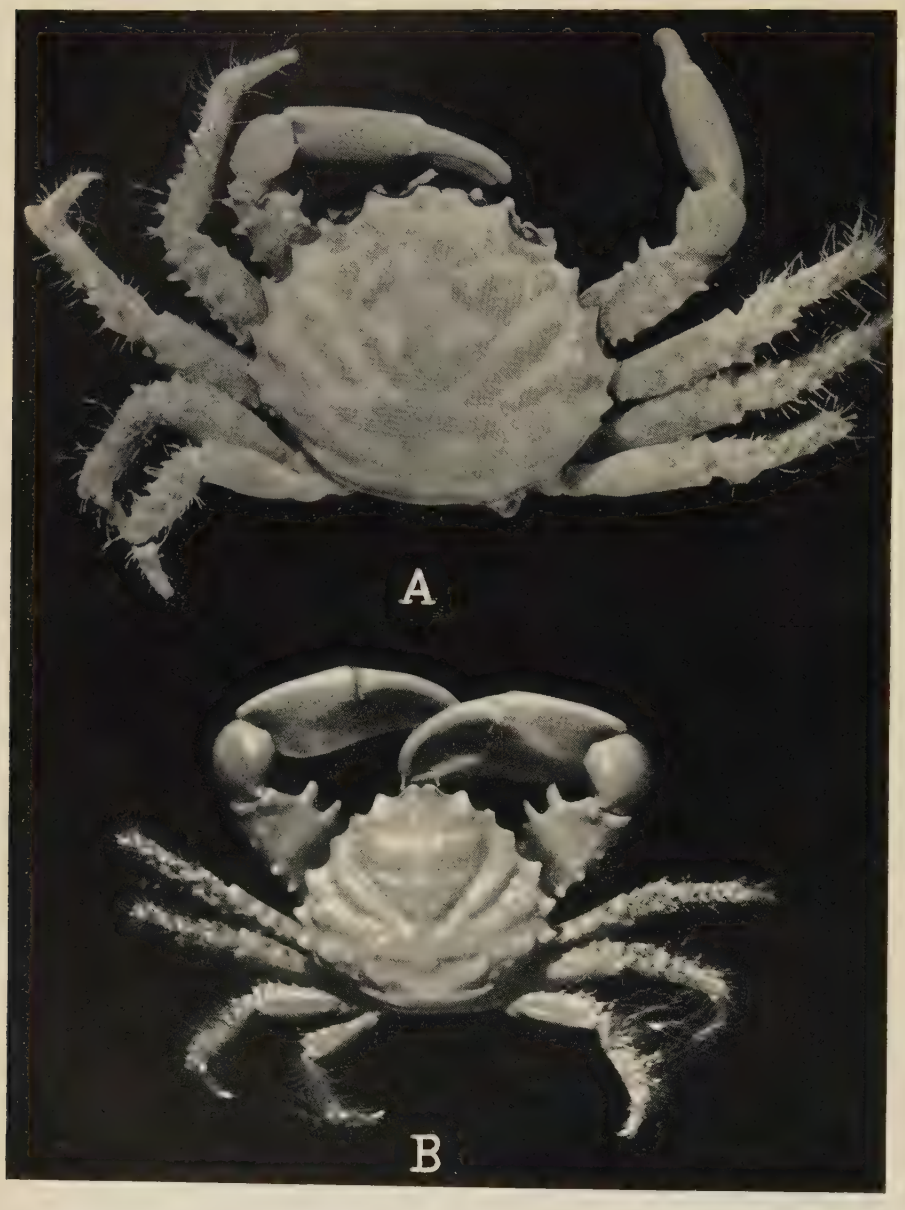
MATERIAL EXAMINED: One large male dredged at Port Tanamo, Cuba, in 2 fms., February 3, 1924. A smaller male dredged in three fathoms, Turtle Harbor, Florida, Nov. 20, 1923. One specimen dredged in 20 fms., south end of Sand Key Light, Key West, Florida, January 29, 1923. One specimen, Marquesas Keys, Fla., 22 fms.

COLOR: Unknown.

TECHNICAL DESCRIPTION: Carapace pyriform, 38 mm. long, 35 mm. wide, cervical and urogastric groove deep, dorsal surface not flat, but not especially convex, broken by many small areolae and tubercles, lateral walls also tuberculate, one sharp, forward curved spine on the hepatic region; the postlateral spine is well developed, set far back. The rostral horns are short, sharp, tips incurved, separated by a V-shaped sinus equal to either horn. Superior orbital margin with four teeth, including the long preorbital and postorbital, also two small teeth on the inferior margin. There are three spines on the basal antennal article, a very long one at the anterolateral angle, which reaches obliquely as far forward as the rostral horns; a shorter one on the inferior orbital margin, and a yet smaller one at the base of the free segment; this latter extends as far forward as the rostrum, and supports a slender flagellum of twice its own length; the free parts of the antennae are furnished with long hairs. The antennulae fold obliquely within the fossett, beneath the rostral hood. The under and side walls of the carapace are full of small, sharp tubercles.

The male chelipeds are equal, massive; the merus is trigonal, armed on the upper surface with a few spines, two or three on the inner lateral margin and five or six on the outer lateral margin; the carpus is smooth, rounded, the propodus is two-thirds as long as the greatest width of the carapace, with a node at the upper and lower basal angles, as does also the merus; the hand is laterally compressed but moderately rounded, smooth; the fingers have a decided gape; the upper one is armed with a single, large, sub-basal tooth; the tips are white, rounded, meeting closely.

The ambulatories are stocky, compressed laterally, densely hirsute; the upper surface of the carpus and merus are spinose; the dactyl is strong, curved, very acuminate.



A.—*Mithrax* (*Mithraculus*) *coryphe* (Herbst), ×2, male. B.—*Mithrax* (*Mithraculus*) *forceps* (A. Milne Edwards), natural size male.

SYNONYMY.—*Mithrax holderi* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 117, 1871.—RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, p. 259, pl. 3, fig. 2, 1898; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 69, 1901; Bull. 129, U. S. Nat. Mus., p. 392, pl. 138, fig. 1 and fig. 2, pl. 257, fig. 2, 1925.

Subgenus: **MITHRACULUS**, as restricted by Rathbun.

Mithrax (Mithraculus) coryphe (Herbst).

Plate 30, fig. A.

DIAGNOSTIC CHARACTERS: Mottled green; legs shaggy; body averages about the size of a penny. Carapace very nodose, one-third wider than long; rostrum small; three anterolateral lobes.

TYPE: Herbst failed to state his type locality; his type was deposited in the Berlin Museum.

DISTRIBUTION: From southern Florida throughout the West Indies to Sao Paulo, Brazil, bathymetric occurrence, shore line to 30 fathoms.

MATERIAL EXAMINED: Five small specimens, one egg-laden, caught in dragnet, Port Antonio, Jamaica, February 17, 1926.

COLOR: Upper surface marbled in two tones of moss-green; underside white; tips of the dactyli touched with coral and tipped with white. Occasionally a specimen is found that is maculated with tiny bluish flecks.

This little marbled green spider crab is very abundant in West Indian waters but is quite inconspicuous because of its coloration and the fact that its legs are very shaggy with algae-like setae. It dwells in the cavities of corals, sponges and rocks, and on sandy and muddy shallows.

TECHNICAL DESCRIPTION: Carapace approximately one-third wider than long and very nodose. The interorbital region is wide; the rostrum consists of two truncated teeth separated by a small sinus; posterior to each horn there is a sharp denticle. There is a single suture on the upper orbital margin; the orbital angles are blunt; the inner inferior orbital lobe is slightly more advanced than the superior one. The basal antennal joint is subtriangulate. The anterolateral margins are armed with three nodular lobes which are the terminations of three oblique elevations separated by deep furrows that cross

the branchial region. The posterior of these elevations is broken into two nodules; there are also a few rounded nodules on the gastric and cardiac regions. The side walls of the carapace are rough with small tubercles in the younger specimens.

The chelipeds are equal, of moderate size in the female, rather massive in the male, the merus with two nodes or teeth on the inner and four or five teeth on the outer margin; the carpus is rounded, the propodus longer than the merus, wide, smooth, the fingers two-thirds as long as the palm, deflexed, widely gaping; old males with one large, sub-basal tooth; tips spoon-shaped, crenulated, meeting.

Ambulatories rather long, heavily fringed with algae-like setae, merus of first and second legs armed with two spines on the inferior margin; carpus of all except the last pair spinulose above.

SYNONYMY.—*Cancer coronatus* HERBST, Natur d. Krabben u. Krebse, vol. 1, p. 184, pl. 11, fig. 63, 1785.

Cancer coryphe HERBST, *ibid.*, vol. 3, pt. 2, p. 8, 1801.

Mithraculus coronatus WHITE, List Crust. Brit. Mus., p. 7, part, 1847. —A. MILNE EDWARDS, Crust. Rég. Mex., p. 106, pl. 20, fig. 1, 1875.

Mithrax sculptus DESBONNE and SCHRAMM, Crust. Guadeloupe, p. 9, 1867.

Mithrax (Mithraculus) coronatus MIERS, Journ. Linn. Soc. London, vol. 14, p. 667, 1879.

Mithrax coronatus MIERS, Challenger Rept. Zoöl., Brachyura, vol. 17, pp. 87 and 89, 1886.

Mithrax coryphe RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 11.

Mithrax (Mithraculus) coryphe RATHBUN, Bijdragen tot de Dierkunde, Natura Artis Magistra, Aflev. 23, p. 20, 1924; Bull. 129, U. S. Nat. Mus., p. 426, pl. 153, 1925.

Mithrax (Mithraculus) forceps (A. Milne Edwards).

Plate 30, fig. B.

DIAGNOSTIC CHARACTERS: Deep bottle green. Carapace wider than long; four acute anterolateral teeth; three oblique sulci running backward from between these teeth onto the branchial region; the ridges between these sulci but little broken up. Chelipeds massive in the male; carpus and propodus smooth.

TYPE: The type came from Guiana and is deposited in the Paris Museum d'Historie Naturelle.

DISTRIBUTION: Rather abundant in shallow water down to thirty fathoms from Cape Hatteras, N. C., southward in the Gulf Stream, through the Gulf of Mexico and Caribbean Sea.

MATERIAL EXAMINED: Two males dredged in Cualeo Reales Channel, Cuba, February 18, 1923. A small male and a female from Cualeo Reales, Cuba, February, 1923, collected by the *"Ara."*

COLOR: Mr. Vanderbilt's field-notes describe the Cuban specimens as being deep green. Many hundreds of this species taken by the writer in West Indian waters were also mottled green. In preserving fluid, these crabs frequently turn the terra-cotta or yellowish brown described by other writers as the natural color of the species.

TECHNICAL DESCRIPTION: Carapace wider than long, 17.5 mm. long, 20 mm. maximum width; interorbital space wide; rostrum consisting of two shallow, rounded teeth separated by a narrow notch; infraorbital angle rounded, more prominent in a dorsal view than the superior angle of the orbit, which is also rounded; postlateral angle rounded, unobtrusive. There are four distinct teeth on the anterolateral margin, the first of which is rounded; the second tooth is the strongest of the series and quite sharp; the third and fourth teeth are also acute; there are three deep sulci running obliquely backward from between these teeth onto the branchial region. The ridges between these sulci are but little broken up, much less so than is the case in *M. sculptus*. There are a pair of low tubercles on the frontal region behind the rostral lobes; a few on the hepatic region and several along the margin and on the posterior part of the branchial region.

The chelipeds are very massive in the male; the merus is trigonal, armed on the inner lateral margin with two teeth; the carpus is smooth, its margin rounded; the propodus is high, elongate, laterally compressed but robust; the fingers are long, with a decided gape meeting only at the spatulate tips; the upper finger is curved and armed with one large, sub-basal tooth; the lower finger bears one large double tooth midway its length, also a tuft of setae near the tip.

The ambulatories are distinctly spiny or nodose on the meral, carpal and propodal joints and furred with fine hairs; the dactyl is stout and sharp.

SYNONYMY.—*Mithraculus forceps* A. MILNE EDWARDS, Crust. Rég. Mex., p. 109, pl. 23, fig. 1, 1875.

Mithraculus hirsutipes KINGSLEY, Proc. Boston Soc. Nat. Hist., vol. 20, p. 147, 1879.

Mithrax forceps MIERS, Rept. Voy. Challenger Zoöl., vol. 17, pp. 87, 88, 1886.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, p. 269, 1892.

Mithrax hirsutipes MIERS, *op. cit.*, p. 87.

Mithrax forceps hirsutipes VERRILL, Trans. Conn. Arts and Sci., vol. 13, p. 409, text fig. 42, pl. 24, figs. 4-6, 1908.

Mithrax (Mithraculus) forceps RATHBUN, Bull. 129, U. S. Nat. Mus., p. 431, pl. 156, 1925; Rapport Betreffende een voorloopig onderzoek naar den toestand van de visscherij, Kolonie Curaçao, p. 345, 1907; Bijdragen tot de dierkunde, natura artis magistra te Amsterdam, 23E Afl., 1924, p. 20.

Genus: **STENOCIONOPS** (Leach Mss.) Desmarest.

Stenocionops furcata (Olivier).

Plate 31.

NAME: Horned crab. Decorator crab.

TYPE: Olivier did not cite his type locality; his type, if extant, is probably in the Paris Museum.

DIAGNOSTIC CHARACTERS: The "horned crab" is one of the earliest recorded American spider crabs, having been figured by Hughes as long ago as 1750, in his "Natural History of the Barbados." It is found from Georgia southward through the West Indies to Brazil. Although relatively abundant in the coral reefs, its nodular body and sponge and seaweed clothing prove an effective camouflage. The sharp, divergent rostral horns, prominent preorbital spine and presence of four long spines on each side on the lateral margin; a prominent median gastric, cardiac and intestinal spine, also several secondary nodules on the dorsal surface of the carapace serve to readily distinguish this species from its allies.

DISTRIBUTION: Known from Georgia southward throughout the West Indies to Bahia, Brazil. Also recorded by Miers from Cape Colony.

MATERIAL EXAMINED: One large female taken in 2 fathoms, Port Tanamo, Cuba, February 3, 1924.

Stenocionops furcata (Olivier), natural size.

Although this crab has been known to naturalists since 1750, its coloration and habits are still a matter of conjecture.

HABITS: This appears to have been one of the first spider crabs to have its curious habit of dressing itself in bits of sponge, seaweed, etc., recorded. One glance at the many stiff-hooked hairs on the body and feet of the crab will suffice to show how well equipped this creature is to fasten its living "clothes" to its body. These safety-pin-like hairs are assisted in their function by the fact that the crab also secrets a cement-like substance from a gland in its mouth, which is used to glue the bits of seaweed, etc., onto its body, thus effecting a camouflage alike from would-be devouring enemies and from its prey.

COLOR: Mr. Vanderbilt's field-sketch, made from a specimen dredged in 30 fathoms, 14 miles southwest of Marquesas Keys, Florida, appears to be the first record of the color of this crab, which has been known to science since 1750. The body is dark vinaceous red, the legs are lighter red. This coloration imitates that of one of the well known West Indian sponges.

TECHNICAL DESCRIPTION: The entire upper surface of the body and legs is covered with a dense coating of red felt, composed of long, pointed vesicles, among which are interspersed many large, curved, or hooked hairs. Carapace elongate pyriform, upper surface rendered moderately uneven by the series of elevations. Rostral horns, two long, equal in length to from one-third to one-half the length of the carapace; slender, pointed, sharply divergent at base, but sometimes with the tips incurved, or subparallel. Superior preorbital spine very prominent, acute, projecting above the eye, hood-like; superior postorbital spine also acute, but much smaller than the preorbital spine from which it is separated by a linear sinus. The lateral margin of the carapace is armed with four large, acute spines, one hepatic and three branchial in position. The dorsum has a rounded prominence on the cardiac and gastric regions each; two projections on the intestinal region, the anterior of which is quite rudimentary, but the posterior one is produced into a curved spine which projects over the posterior margin.

The antennulae fold almost vertically within the septum.

The antennae have the basal joints enlarged, anchylosed, the antero-internal angle produced into an acute spine, the antero-external angle produced into another acute spine, which is subequal to the postorbital spine; the flagellum is a long, slender, two-jointed rod, curi-

ously armed on the inner and outer sides with seven paired, elongate vesicles, each of which is two-thirds as long as the flagellum.

The external maxillipeds are typical, close-fitting, the external surface closely beaded with coarse granules; the inner margin of the ischium is armed with a series of saw-like denticles which interfit with those of the opposite side.

The female abdominal belt is large, circular, convex, forming a pouch that practically covers the entire sternal plate.

The chelipeds (female) are small, equal, covered with felt-like pubescence, the merus armed with a series of spines; the propodus is slender; the fingers slender, subequal, the cutting edge armed with a series of fine teeth, the tips meeting. The male chelipeds are greatly developed, the merus being slightly longer than is the carapace, while the propodus is a little longer than the merus. The spines are much more developed on the male chelipeds than on the female.

The ambulatories are similar, slender, covered with felt, the propodal-dactyl joint strongly reinforced, the dactyl strong, curved, the tip acuminate, horn-tipped.

Synonymy.—"Horned crab" Hughes, Natural History of Barbados, p. 266, pl. 25, fig. 3, 1750.

Cangrejo cornuda Parra, Descripcion de diferentes piezas de Historia Natural, p. 135, pl. 50, figs. 2 and 3, 1787.

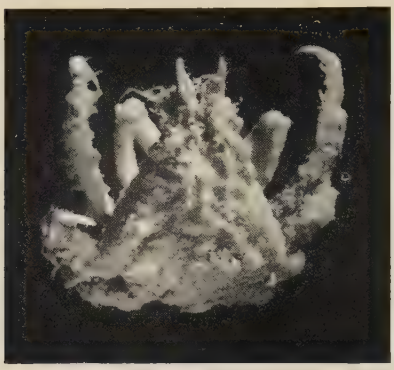
Cancer furcatus Olivier, Encyc. Méth. Hist. Nat., Insectes, vol. 6, p. 174, 1791.

Cancer cornudo Herbst, Natur. Krabben u. Krebse, vol. 3, part 4, p. 6, pl. 59, fig. 6, 1804.

Pericera cornuta Milne Edwards, Hist. Nat. Crust., vol. I, p. 335; Cuvier's Règne Anim. disciples ed., atlas, pl. 30, fig. 1.—A. Milne Edwards, Crust. Rég. Mex., p. 51, 1873.—Miers, Journ. Linn. Soc. London, Zoöl., vol. 14, pp. 664, and 673, pl. 13, figs. 4 and 5, 1879.—Gundlach and Torralbas, Ann. Acad. Habana, vol. 36, p. 362, text fig., 1899 (issued 1900); reprint, p. 19, fig. 10, pl. 4, 1917.

Chorinus armatus Randall, Jour. Acad. Nat. Sci. Phila., vol. 8, p. 108, 1839.

Stenocionops furcata Rathbun, Ann. Inst. Jamaica, vol. 1, p. 6, 1897; Bull. 129, U. S. Nat. Mus., p. 449, pls. 160 and 161, text fig. 131, 1925.



A

B

A.—*Microphrys bicornutus* (Latreille), ×1.2. B.—*Macrocoeloma eutheca* Stimpson, ×1.5.

Genus: **MACROCOELOMA** Miers.

Macrocoeloma eutheca Stimpson.

Plate 32, fig. B.

NAME: Tube-eyed sponge crab. Orange sponge crab.

DIAGNOSTIC CHARACTERS: Rostral sinus U-shaped. Orbital tubes very long. Carapace subpyriform, decidedly constricted behind orbits.

TYPE: The localities of Prof. Stimpson's type specimens are given as "off French Reef, 15 fms., and west of Tortugas, 37 fms." The types, unfortunately, are not extant.

DISTRIBUTION: Although this species was established in 1781, only about twenty specimens have been recorded since. These come from Miami, Florida, southward through the Florida Keys, the Bahama Banks, Barbados, off Havana, Cuba, St. Croix, near Colon, Panama, and off Yucatan.

MATERIAL EXAMINED: One female, dredged in 20 fms., off Sand Key Light, Key West, Florida, January 29, 1924.

COLOR: This exquisite little crab is a vivid orange flame color, with golden brown eyes. The surface of the carapace and appendages are covered with hooked hairs, by means of which the crab fastens bits of seaweed, or more frequently sponges, to itself as a camouflage. This quaint procedure enables the grotesquely humped little creature to become as indistinguishable a fragment of its environment as is one of the tiny blocks in an age-mellowed Florentian mosaic.

When one recalls that *Macrocoeloma eutheca* is an inhabitant of the coral rock bottoms of shallow waters, ranging occasionally down as deep as 45 fathoms, the seemingly grotesque form with its corrugations and rugosities is recognized as a marvelously perfect replica of a bit of that eons-old geologic formation so well known to all students of the West Indies.

Seen only in the dredge net, one marvels that such perfection of sculptured mimicry should apparently be counteracted by the flaming orange color—a hue reminiscent of the vivid butterfly-weed of Virginian meadows. Yet I have spent hours searching for this species off the Cocolobo Cay, dawn-to-sunrise hours, a period of maximum activity for this little creature, whose uncanny gift of camouflage defied penetration. The flaming orange hue, semi-clothed by sponges,

was as indistinguishable from the maze of their own vivid orange colonies as a khaki-clad soldier marching with his regiment. Deciding to watch for the tubular eye of the crab-mosaic, I found that it became lost through resemblance in a maze of sponge osculi. Only when a seeming Eocene pebble seized with flashing rapidity a silvery rose minnow and forced it with mimic tyrant power under the seeming orange sponge could I truly say: "There is *eutheca!*" A second and the rainbow minnow was gone—the seeming pebble immutable. Over the pebble a shadow presaged danger—seen from above, a school of ethereally beautiful blue parrot fish—seen by the tiny tube-encased crab-eye, a school of titanic carnivorous enemies, whose powerful beak could crush even the little fighting conch. Inscrutable as Buddha, the crab awaited Fate, its weapon claws powerless against these Titans, lay as immutable pebbles beside an orange flame "sponge," an animal as unpalatable to fishes as crabs are desirable, the tiny eyes staring—unwinking, two sponge osculi, watched danger pass; the hungry keen-eyed parrots were outwitted in a game begun by their ancestors millions of years ago. Reaching down to examine this gallant little chap, my careful hand disturbed the waters and a miracle was enacted in my hand—the orange-flame paled, faded, was gone; I held only a grotesque fragment of colorless, creamy coral rock that sought to "flatten itself" into the new environment. Carefully avoiding touching the legs, because of their well-known habit of breaking off in an effort to effect escape, I placed *eutheca* in a jar with white algae. In a few minutes the little claws were engaged in removing bit by bit the dress of orange sponges and green-brown algae and, with infinite patience, replacing little white algae under the hook-like hairs that hold this robe de camouflage in place. Two hours and thirteen minutes were required for this transformation. Later on, at the laboratory, I placed this same specimen, still garbed in white algae, in a large aquarium, equidistant from a clump of orange sponge, one of white algae and one of green sea-lettuce. With unerring precision, my little friend scuttled for the orange sponge, cast off the white algae robe and patiently dressed in orange. This procedure, repeated a score of times with several specimens, invariably resulted in a selection of orange sponge.

Technical description: Carapace rugose, subpyriform, contour subtrapezoidal, decidedly constricted behind the orbits. Rostral horns, slender, graceful, largely subparallel, tips a little divergent, sinus broad, U-shaped. Orbital sheath decidedly prominent, directed

obliquely forward, upward and outward and prolonged decidedly beyond the ventral surface of the basal article of the antennae; the orbital margin is provided with four teeth, one superior, situated in front of the closed sinus, one inferior belonging to the antennal base, one preocular and one postocular. There is a pair of low tubercles, one each in the prominence of the protogastric region, a strong, median, upward directed spine on the gastric and in line with this, a similar subequal spine on the cardiac region, and a slightly smaller, outward-directed spine on the intestinal region but so far back that it projects beyond the posterior margin. There is a pair of low tubercles, each one the summit of the branchial region. There is a pair of strong outward and posteriorly directed spines at the postlateral angle and parallel to the cardiac spine. The outer antennae have the basal article decidedly enlarged, and a spine near its lower distal angle, another suborbital, and a long one projecting outside the second antennal joint; the second and third joints are subequal, slender, their combined length being less than that of the rostrum; the antennae consist of about eighteen long, slender, subequal articles, each of which is armed with several very long tactile hairs. The inner antennae have their massive basal joint situated within the septum; the two slender, somewhat cylindrical joints, of which the first is longer, fold upon each other and fit within the antennal septum; the brief, biramous flagellum is composed of a minor branch consisting of five rings and a stouter conically formed branch consisting of eleven rings and furnished with a dense brush of setae.

The external maxillipeds have the ischium much longer than the merus and furnished along the inner margin with both conical teeth and long, curved, spinelike hairs; the merus is rather wider than long with the distal border somewhat flaring; there is an incision at the inner distal angle, from which arises the subequal, tapering, three-jointed palp; the exognath reaches almost to the distal angle of the merus and bears a concealed, long lash. There are four tubercles on the pterygostomian region.

The chelipeds are equal in both sexes, long, slender, depressed cylindrical. The coxa is short, stout and on the ventral surface has a small node which interlocks in a process of the sternal plate; the basis is very small, the ischium situated ventrally and produced distally to a rounded, triangular point; the merus is very long and armed with four longitudinal rows of tubercles; the dactyli subequal, gaping, the upper slightly more curved than the lower; the upper dactyl bears a

U. S. Fish & Wildlife Service
Seattle, Washington.

row of eight sharp triangulate teeth along the outer edge and a large molar midway the inner surface, which is also furry.

The first ambulatory legs are spidery thin and reach as far forward as the carpus of the chelipeds. The coxa has a node interlocking with the process of the sternal plate; the basis and ischium are short, the merus is the longest joint of the limb, the carpus elongate, half the length of the propodus which is only a little shorter than the merus, and the dactyl is half as long as the propodus, scimitar-like. The second, third and fourth pairs of ambulatory legs are quite small and successively decrease in size posteriorly. In structure they are replicas of the first ambulatory legs, but the second pair is only a little over half as long as the first.

SYNONYMY.—*Pericera eutheca* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 112, 1871.—A. MILNE EDWARDS, Crust. Rég Mex., pp. 58 and 200, pl. 15A, figs. 1 and 1c, 1873. Not AURIVILLIUS K. Sv. Vet. Akad. Hand, vol. 23, pt. 1, p. 55, pl. 2, fig. 1, 1889.

Macrocoeloma eutheca MIERS, Challenger Rept. Zoöl., vol. XVII, pp. 80 and 82, 1886.—M. J. RATHBUN, Proc. U. S. Nat. Mus., vol. 15, p. 251, 1892; Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, p. 257, 1898; Bull. 129, U. S. Nat. Mus., p. 484, pl. 170, fig. 1, pl. 171, fig. 1, 1925.

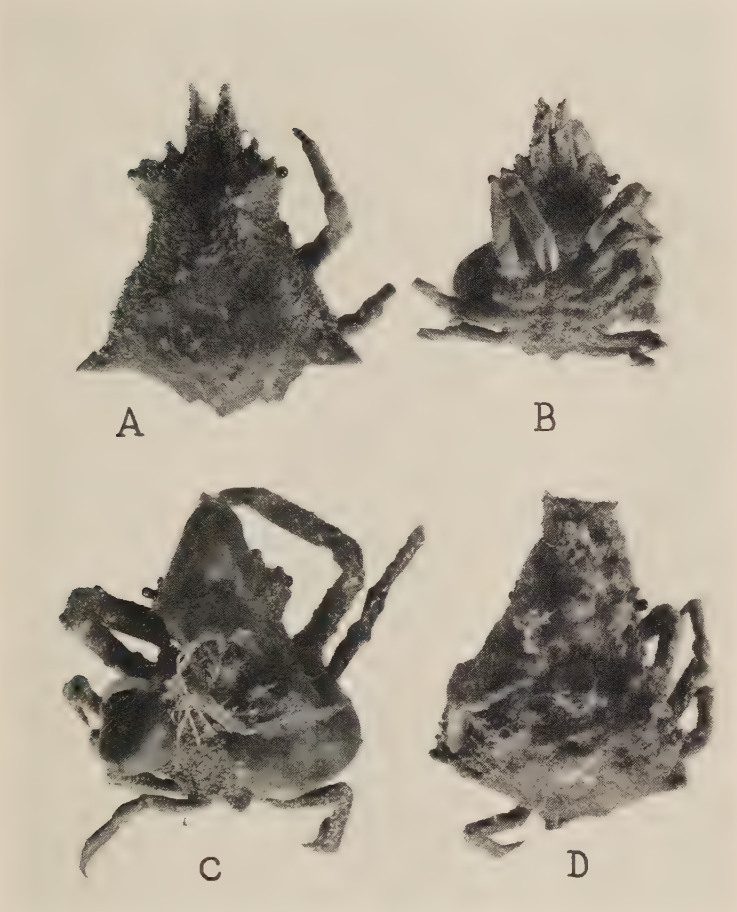
Macrocoeloma trispinosum (Latreille).

Plate 33, figs. A, B, C and D.

NAME: Grass crab.

DIAGNOSTIC CHARACTERS: Carapace subpyriform, tumid; rostral horns slender, long, acuminate, adjacent and subparallel at base, divergent distally. Four dorsal prominences, each tipped with a tubercle forming a cross on the carapace, the largest tubercle gastric. Postlateral angles produced into sharp spines; a sharp, median, upward-pointing spine on the posterior region. Two varieties of this species besides the typical form are known.

TYPE: Latreille's type came from "Nouvelle Holland" and is deposited in the Paris Museum. Dr. Rathbun states that this locality is an error, but I think that Latreille's locality is correct. In those days the islands of Tobago, St. Eustace, St. Martin's and Saba were entirely or partially under Dutch control, and were frequently referred to as "New Holland."



Macrocoeloma trispinosum (Latreille). A, dorsal view; B, ventral view; C and D, two sponge-clad females.

DISTRIBUTION: This crab has been known since 1756 and has been found from North Carolina southward to Brazil, including stations off Yucatan and several of the islands of the West Indies; bathymetric occurrence, shallow water to 45 fathoms.

MATERIAL EXAMINED: Twenty-one specimens, males and females, taken in dragnet, Cardenas, Cuba, March 5, 1928; one rather large female from the south coast of Cuba, February 19, 1923.

COLOR: Mottled moss-green, with splotches of darker bottle green; setae red-brown.

TECHNICAL DESCRIPTION: Carapace densely covered with short hairs, also with many longer, curved, fish-hook-shaped hairs, by means of which the protective clothing, usually consisting of sponges, is held in place. Carapace roughly subpyriform, tumid, wide at the orbital line, narrowed in the posterior region, thence widening posteriorly; postlateral angles of the carapace produced into a strong, tapering, acuminate spine which is directed obliquely backward and outward and a little curved upward. There is a short, obliquely erect spine in the median line above the posterior margin. There are four large, rounded prominences, each with a tubercle at the summit, on the upper surface of the carapace outlining a cross; the one on the gastric region is the largest. The rostral horns are paired, flattened, adjacent and subparallel at the base, divergent distally. There is much diversity within the species in the length, curvature and direction of the horns, which range from 20 to 40 percentum of the length of the remainder of the carapace. The superior orbital margin is oblique, sharply emarginate, cleft by a suture not far from the postorbital angle; preorbital angle prominent, forward curved; postorbital angle rounded, closely appressed. The cornea is well developed and projects beyond the orbital cavity. Between the preorbital angle and rostral horn there is visible a long, acute spine pointing obliquely outward; this arises near the inner angle of the basal article of the antennae. The antennal flagellum is slender, multiarticulate, and reaches three-fifths of the length of the rostral horn. The antennulae fold obliquely within the fossett.

The external maxillipeds are close-fitting and have the merus shorter than the ischium, squarish, except that the outer distal angle is rounded and the inner one excavate for the insertion of the palp.

The chelipeds are equal, longer in the male than in the female; those of the former having the merus and propodus subequal, each about as

long as the width of the carapace between the eyes, while the same articles in the female are only three-fifths as long or less.

The ambulatories are similar, stocky, with stout, curved, acuminate dactyli.

The female abdominal belt is large, subcircular, with the median line vaulted. The male belt is narrow, with the tip rounded, triangulate.

SYNONYMY.—*Cancer* 9, BROWNE, Nat. Hist. Jamaica, 1756, p. 422, pl. 48, fig. 2.

Pisa trispinosa LATREILLE, Encycl. Méth. Hist. Nat., vol. 10, p. 142, 1825.

Pericera trispinosa GUÉRIN, Icon. Règne Anim. Crust., pl. 8, figs. 3, 3a, 1825.—H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 336, 1834.—AURIVILLIUS, K. Sv. Vet. Akad. Hand., vol. 23, pt. 1, p. 55, pl. 2, fig. 2, 1889.

Pericera dicantha A. MILNE EDWARDS, Crust. Rég. Mex., p. 57, 1875.

Pericera diacantha A. MILNE EDWARDS, op. cit., pl. 15, figs. 3-3a.

Macrocoeloma trispinosa MIERS, Journ. Linn. Soc. London, vol. 14, p. 665, 1879.

Macrocoeloma diacantha MIERS, Voy. Challenger Rept. Zoöl., vol. 17, p. 79, 1886.

Macrocoeloma trispinosum RATHBUN, Proc. U. S. Nat. Mus., vol. 21, p. 576, 1898; Bijdragen tot de Dierkunde, natura artis magistra, Afl. 23E, 1924, p. 21; Bull. 129, U. S. Nat. Mus., p. 466, pl. 166, fig. 1, pl. 167, 1925.—BOONE, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 40, 1927.

Macrocoeloma diacanthus RATHBUN, Proc. U. S. Nat. Mus., vol. 21, p. 576, 1898.

Genus: **MICROPHRYS** H. Milne Edwards.

Microphrys bicornutus (Latreille).

Plate 32, Fig. A.

DIAGNOSTIC CHARACTERS: Carapace subtriangulate, produced into a spine at each lateral angle; rostral horns divergent, from one-third to one-half as long as carapace. Chelipeds equal, moderate, speckled with numerous large, purplish magenta spots.

TYPE: Latreille's type came from "Nouvelle Holland" (old name for Tobago and St. Martin's, W. I.), and is deposited in the National Museum d'Histoire Naturelle, Paris.

DISTRIBUTION: Known sparingly from Beaufort, N. C., to Miami, Florida, and more abundantly in southern Florida, the Bermudas, Bahamas, and West Indies, southward to Desterro, Brazil, in depths ranging from the tide-line to 40 fms., more abundant in shallow water. Latreille's type locality, Nouvelle Holland, translated in present-day geographic terms would be either Dutch Guiana, St. Eustace, St. Martin's or Tobago, W. I.

MATERIAL EXAMINED: One female taken at Pigeon Key, Florida, April 17, 1923. One male taken at Hogsty Island, San Salvador, Feb., 1926. Two large males taken in dragnet, Cardenas, Cuba, March 5, 1928.

HABITS: This is the "grass crab" of the early British Colonial naturalists, a name derived from the fact that *bicornutus* clothes itself with seaweed, sponges, etc., as a camouflage to protect it from its enemies.

TECHNICAL DESCRIPTION: Carapace subtriangular, with rostral horns slightly more than one-third as long as the rest of the body; carapace rather tumid posteriorly, the anterolateral angles far back and produced into a spine. The upper surface of the carapace is rough; the cervical and urogastric grooves deeply delineated; there are several prominent tubercles on the elevated part of the gastric region; the cardiac region has four or five; there are several on the more elevated parts of the branchial region, and four to six form an arc on the intestinal region. Numerous hook-like setae are scattered over the carapace. The rostral horns are triangular, flattish on the upper surface, divergent throughout their length, except that occasional young specimens have the tips incurved. The basal antennal segment has a flat, obtuse spine at the anterior angle, which is dorsally visible as a knob-like projection; behind this spine on the margin is a small spine. The first and second free articles of the antennae are subequal in length, lie beside the rostrum, extending half its length; the flagellum is multiarticulate, reaching beyond the rostrum for a distance equal to the length of the rostrum. The preorbital angle is blunt, nearly right-angled. The postorbital angle is also blunted. The cornea is prominent and never covered by the sponges, etc., beneath which the crab conceals itself.

The external maxillipeds have the ischium of the endognath dentate along the inner margin and produced into a lobe at the anterior-internal angle; the merus is a trifle longer in the median line than the ischium and has the outer distal angle slightly produced and rounded and the inner one emarginate with a slight peak on the distal margin at the outer angle of the incision for the reception of the palp.

The chelipeds are equal, moderately slender in the female, more massive in the males. The meral joint in an old male extends forward to midway the rostral horn; the carpus is small, rounded; the propodus is one-third longer than the merus, the lateral margins subparallel, the outer face moderately rounded and covered with large, leopard-like spots of deep purplish magenta; the fingers are also spotted, scarcely one-half as long as the palm, the tips meeting, spatulate and crenulate, a slight gape proximally in the fingers of large male, and one elongate, sub-basal tooth on the upper finger; in smaller males and females this tooth is obsolete.

The ambulatories are very slender but strong and covered with many hairs. The dactyli are strong, interlocking basally with a protuberance from the propodus, the tip is acuminate.

Synonymy.—*Pisa bicornuta* Latreille, Encyc. Méth. Hist. Nat. Insectes, vol. 10, p. 141, 1825.

Pericera bicorna H. Milne Edwards, Hist. Nat. Crust., vol. 1, p. 337, 1834.

Pisa bicorna Gibbes, Proc. Amer. Assoc. Adv. Sci., vol. 3, p. 170, 1850.

Pericera bicornuta Guérin, in La Sagra's Hist. Nat. Cuba., p. xii, 1856.—von Martens, Arch. f. Naturg., vol. 38, p. 85, pl. 4, fig. 5, 1872.—Gundlach and Torralbas, Ann. Acad. Habana, vol. 36, p. 363, 1899 (1900), text fig.; reprint, p. 20, pl. 5, fig. 11, 1917.

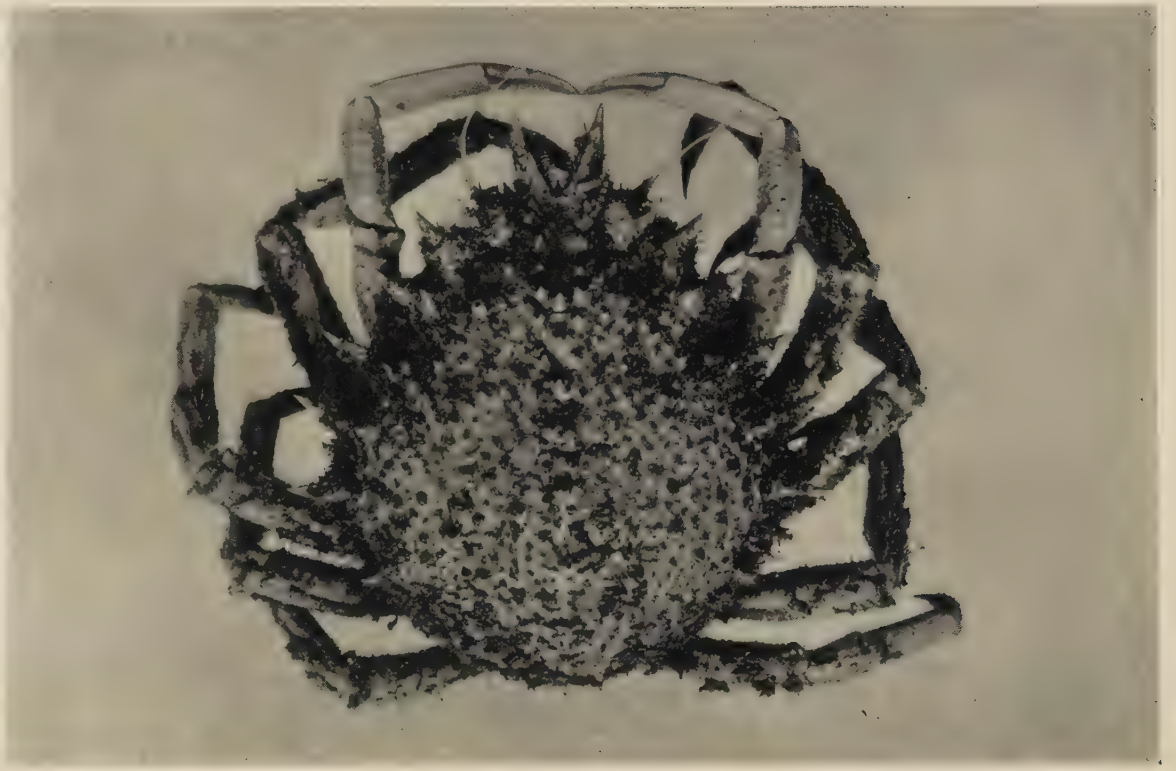
Pericera bicornis Saussure, Mém. Soc. Phys. Nat. Genève, vol. 14, p. 427, pl. 1, fig. 3, 1858.

Milnia bicornuta Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, p. 180, 1860.

Pisa galibica Desbonne, in Desbonne and Schramm, Crust. Guadeloupe, p. 18, 1867.

Pisa purpurea Desbonne, *ibid.*, p. 18.

Omalacantha hirsuta Streets, Proc. Acad. Nat. Sci. Phila., ser. 3, vol. 1, p. 238, 1871.



Maia verrucosa H. Milne Edwards, one-half of natural size.

Microphrys bicornutus A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., vol. 8, p. 247, 1872; Crust. Rég. Mex., p. 61, pl. 14, figs. 2-4, 1873.—Rathbun, Bijd. Dierk, Zoöl., Amsterdam, Aflev. 23, p. 18, 1924; Bull. 129, U. S. Nat. Mus., p. 489, pl. 175, and text fig. 139, 1925.

Microphrys bicornuta Kingsley, Proc. Acad. Nat. Sci. Phila., vol. 31, p. 386, 1879.

Family: **MAIIDAE** Miers.

Subfamily: **Maiinae.**

Genus: **MAIA** Lamarck.

Maia verrucosa H. Milne Edwards.

Plate 34.

Name: Mediterranean giant spider crab.

Type: Prof. H. Milne Edwards does not state the depository of this type which "inhabits the Mediterranean Sea."

Distribution: Mediterranean Sea and coasts of Hispanic Peninsula.

Material examined: Two, Casa Blanca, Morocco.

Habits: This is the largest of the Mediterranean spider crabs. It lies hidden in the rock crevices in deeper water, concealing itself by covering its back with small pebbles, sand particles, etc., which are semi-fastened by the long, stiff, brown hairs.

Remarks: This crab is used as an article of food by the poorer classes.

Technical description: Carapace 83 mm. long, exclusive of rostrum, 73 mm. maximum width, exclusive of spines; broadly pyriform, almost oval, the rostrum consists of two short, widely divergent, triangulate horns, each 11 mm. long, the upper surface moderately convex, armed all over with short, conical, upstanding spines, some of which are smaller than others, and with a dense coating of stiff, brown hairs, many of which are hooked. The basal antennal article bears two sharp spines, one at its inner distal angle, which is ventral and points outward, and a longer one at its external distal angle, which is directed obliquely outward and is dorsally visible. There is also a small spine at the lower distal angle. There is no preorbital spine;

there is one large, triangulate, upward-pointing spine above the eye, in addition to the larger triangulate postorbital spine which is directed outward and forward; there are four similar obliquely outward and forward-directed anterolateral spines, one hepatic and three branchial, the first, second and third of these spines each has inside it near the base a shorter, strong, conical spine; there is one strong, upcurved, postlateral spine which is placed much higher upon the carapace than are the lateral spines; there are also two or three small spines on the postlateral line. In addition to the numerous small spines on the dorsal surface there are in the median line on the gastric region three larger, conical up-pointing spines and behind the third of these a pair of similar, submedian spines, followed by one large median spine on the genital region, one on the cardiac followed by a submedian pair of slightly smaller spines which in turn are followed by one small median spine on the intestinal region. In a line running in obliquely from the high postlateral spine are two, sharp, conical spines on the branchial region which are smaller than the postlateral spines but distinctly larger than the very numerous little spines of the carapace. The pterygostomian region is very spinose and there is a broken line of spinules on the lateral walls below the large spines.

The free joints of the antennal peduncle are set in the orbital sinus and are small; the tapering, whip-like antennae is twice as long as the rostral horn.

The antennulae are prominent and fold obliquely within the fossett. sett. The median projection from the roof of the rostrum, semi-separating the fossett into two chambers, is produced into a very strong spine curved down and then forward.

The eyestalk is very small, slightly curved basally, tapering distally; the cornea is elliptical, terminal, placed obliquely at the end of the stalk.

There is practically no difference in size between the chelipeds of the male and female. The chelipeds are slender, the ischial joint bulbous and produced obliquely to a strong point at the inner distal margin, reinforcing the short, subcylindrical merus, which is spinous on the upper surface, as is also the carpus, which is almost as long as the merus; the hand is smooth, laterally compressed, slightly convex; the fingers are two-thirds as long as the hand, slender, curved, tapering, with a buttonhole-like gape proximally, the distal two-thirds of the edges meeting upon each other.

Parthenope (*Parthenope*) *agonus* Stimpson, ×1.5.

The ambulatories are very stout, stronger than the chelipeds, the meral joints elongated, cylindrical, produced on each side at the distal margin into a node, the carpus is two-thirds as long and similar to the merus; the propodus is four-fifths as long as the merus and almost as stocky; the dactyl is almost as long as the propodus, stocky, curved, with a very strong, acuminate, brown tip. The first ambulatories are practically as long as the chelipeds; the remaining pairs successively decrease in size posteriorly; all are densely coated with stiff, brown setae.

The female abdomen is moderately ovate; vaulted in the median line. The male belt is seven-segmented with its tip rounded.

SYNONYMY.—*Cancer squinado* HERBST (part), Natur. Krabben u. Krebse, Bd. 1-3, Berlin, 1782, p. 214, Taf. 14, figs. 84 and 85.

Cancer maia, piu piccolo, OLIVI, G., 1792, Zoöl. Adriactica, p. 46.

?Maia crispata RISSO, Hist. Nat. de l'Europe, Merid., vol. 5, 1826, Paris, p. 23.

Maia verrucosa H. MILNE EDWARDS, Hist. Nat. Crust., T. I, p. 328, pl. 3, figs. 1-14, 1834.—HELLER, Crust. sudl. Europa, p. 50, 1863 (with synonymy).—A. MILNE EDWARDS and BOUVIER, Exped. Sci. du Travailleur et du Talisman, Crust. Décap.—O. PESTA, Die Decapodenfauna der Adria, 1918, (Leipzig und Wien, p. 364, fig. 117 and very full synonymy).

Family: **PARTHENOPIDAE.**

Subfamily: **Parthenopinae.**

Genus: **PARTHENOPE** Weber.

Subgenus: **Parthenope** Rathbun.

Parthenope (Parthenope) agonus (Stimpson).

Plate 35.

DIAGNOSTIC CHARACTERS: Carapace ovate-pentagonal, slightly wider than long; on the sidewall just posterior to the cheliped is one large, acute spine. Chelipeds are three to nearly four times as long as the carapace.

TYPE: Prof. Stimpson's type material was taken off the Marquesas, off Conch Reef and off Carysfoot Reef, in depths ranging from 40 to 49 fms.; they are no longer extant.

DISTRIBUTION: From Cape Hatteras, N. C., southward in the Gulf Stream along the Florida coasts and Keys, and in the Gulf of Mexico, Porto Rico and Trinidad, in depths ranging from 27 to 90 fms.

MATERIAL EXAMINED: Two egg-laden females dredged in 50 fms., American Shoal Light, Florida, March 8, 1924, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: The carapace is ovate-pentagonal, 16 mm. long from tip of rostrum to posterior margin; 18 mm. maximum width. The rostrum is produced to an acute tooth whose lateral margins are finely dentate; the preorbital angle is prominent, the upper sinus is deeply cleft; between it and the postorbital angle are two strong teeth, the postorbital angle is acute, bidentate; the lateral margin is rounded; the pterygostomian region is unusually prominent, extending as a dentate ridge from the postorbital angle to the anterior margin of the cheliped as a line of coarse, dentate spines; just posterior to the cheliped is one large, acute spine; there is one tubercle on the hepatic and six on the branchial margin. The cervical groove is well defined, but the regions are less deeply separated than in *P. pourtalesii;* the branchial lobes are convex, covered with granules and five spiniform tubercles, the longest of which is posterior and spine-like; there is one tubercle on the hepatic region; a transverse row of four on the anterior gastric region, behind which in the median line is a single, larger tubercle; on the cardio-intestinal regions there are three tubercles in the median line; on each side of this lobe near the posterior margin is a spinous tubercle. The first abdominal segment is produced to a laminate, triangular tooth on the median region and a smaller tooth at each angle; the second article is similarly but less pronouncedly produced; the fourth, fifth and six segments are distinctly ridged longitudinally in the vaulted median line. The specimen in question is carrying about five thousand eggs; these are minute, orange spheres and form a "sponge" two-thirds as large as the crab.

The antennulae are large and fold obliquely within the fossett.

The antennae are situated within the antennal cavity; the first segment bears one spine on the outer face, the second article bears three spines, one of which is distal, the third article is similarly ornamented; the flagellum is slightly longer than the peduncle, slender, multiarticulate.

The external maxillipeds have the ischium about one and two-thirds times as long as the merus, with a distinct longitudinal groove; the inner lateral margin dentate, the inner distal angle lobed; the merus

Parthenope (*Platylambrus*) *serrata* (H. Milne Edwards). A, female; B, male; natural size.

has the distal margin truncate, the outer angle slightly produced, right-angled, the inner distal angle emarginate; there are two oblique rows, each consisting of three denticles crossing the outer face of the merus; also one denticle near the external angle; the palp has a spine at the outer distal angle of the first and second articles.

The eye is small, well hooded, with a calcareous, tongue-like projection bearing an upstanding spine on the upper surface.

The female chelipeds are approximately two and one-half times as the maximum width of the body, very slender and granulose; the merus has three rows of longitudinally placed spines on the upper surface, one each on the inner and outer lateral margins, and the third row medially at the summit of the upper surface; the carpus is short, spinose on its outer lateral and distal margins; the propodus, exclusive of the finger, is as long as the merus, with the outer and inner lateral margins each armed with a series of unequal serrate teeth, thirteen on the upper, fourteen on the lower, the upper surface between bears a number of granules and two or three irregularly placed spines; the under margin of both merus and propodus is finely denticulate; the fingers are one-third the length of the palm, deflected, both with the cutting edges coarsely denticulate; the upper finger bears on its proximal portion two convergent rows of spines which unite to form one line distally. The male chelipeds are said to be three to four times as long as the body.

The ambulatories are very slender and long, smooth, except for faint indications of spinules on the anterior margin of the merus.

SYNONYMY.—*Lambrus agonus* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 131, 1871.—A. MILNE EDWARDS, Crust. Rég. Mexico, p. 151, pl. 28, figs. 3-3c, 1878, atlas, 1879.—RATHBUN, Bull. U. S. Nat. Mus., p. 513, pl. 178 and 179, pl. 275, figs. 1-3, text fig. 146, 1925.

Subgenus: **PLATYLAMBRUS** Stimpson.

Parthenope (Platylambrus) serrata (H. Milne Edwards).

Plate 36, figs. A and B.

DIAGNOSTIC CHARACTERS: Carapace triangular, flattish, anterolateral margins convex, with 7 or 8 teeth; a strong, outpointing lateral spine. Chelipeds extremely long, flattish, serrate margins (see below).

TYPE: This type is deposited in the Paris Museum, with the label: "l'ocean Indien." The maps of that period occasionally referred to

the West Indian region as the "Indian Seas." I do not think that Professor H. Milne Edwards was in error, but that some present-day writers have merely overlooked the above fact.

DISTRIBUTION: Known from shallow water to 50 fms., from Beaufort, N. C., southward, including the Bahamas, Bermudas, Florida, the Gulf of Mexico, the West Indies down to Curaçao; also Brazil.

MATERIAL EXAMINED: Two males and one female from Porto Padre, Cuba, March 15, 1928. One male dredged in 50 fms., American Shoal Light, Florida, March 3, 1924, establishing the greatest depth from which this species has been taken. One male taken at Port Segua la Grande, Cuba, in 3 fms., February 23, 1925.

COLOR: In life this species is a deep sandy gray with a rose tinge and with minute black flecks, resembling the sea-sands in which it spends the greater part of its life buried, except for its eyes and breathing apertures.

TECHNICAL DESCRIPTION: Carapace flattish, triangular, rostrum short, prominent, consisting of a median tooth flanked on each side by a smaller tooth; channelled on the upper surface; anterolateral margins rounded, protruding out into 7 or 8 serrate teeth; one strong, outward pointing spine at the angle formed by the anterolateral and postlateral margins; the latter are wide, slightly convergent, arcuate. The gastric and cardiac regions are elevated; a deep pit on either side marks the urogastric line; the branchial regions are well defined and elevated. There are numerous tubercles and elevations on the upper surface; five of the larger tubercles occur in the median line: two gastric, two cardiac, one intestinal, this last being on the posterior margin; on either side there are three large granules on the posterior margin and running obliquely inward from this is a line of granules, some of which are much larger than others. Beneath and below the lateral spine there is a single spine-like tubercle opposite the base of the first ambulatories. The pterygostomian and subhepatic regions bear an excavation which reaches to the inferior external orbital margin, forming, with the assistance of the retracted chelipeds, covered afferent passages, whose external apertures are between the base of the finger and margin of the orbit.

The antennae are very small.

The antennulae are large and fold obliquely within the rostral hood.

The external maxillipeds have the ischium nearly twice as long as the merus, longitudinally channelled, serrate on the inner lateral margin; the merus is bent inward toward the rostrum and bears a single large tubercle on its outer surface which also has many setae; the palp is small.

The chelipeds are greatly elongated in both sexes and flattened on the upper surface; the meral joint in the female is equal in length to one-half the width of the carapace, whereas in the male the same joint is equal to the width of the carapace; the carpus is about one-fourth as long as the merus and the propodus is a trifle longer than the merus; the fingers are short and deflected; the lower finger is armed with three or four teeth on the cutting edge; the upper finger is curved to fit upon the lower. The chelipeds are trigonal in cross-section, the upper surface flattish, the outer lateral margin of the merus armed with four or five teeth, that of the carpus with three or four teeth and that of the propodus with nine teeth, which latter are quite coarse and unequal. The inner lateral margins are also serrate, but the teeth are less coarse. There are two or three teeth on the proximal upper surface of the hinged finger. There is an approximately median longitudinal line of coarse granules on the upper surface of the merus and a few other scattered large tubercles, also some on the propodus.

The ambulatories are very slender, the first or longest pair not reaching to the distal end of the merus of the chelipeds. Each ambulatory has a slender, curved, acuminate dactyl, which is marked on each side by two deep longitudinal grooves.

The male abdominal belt has the first and second segments hinge-like, the third, fourth and fifth anchylosed; the sixth segment vaulted and armed with a median spine; the seventh, rounded distally.

The female abdominal belt is seven-segmented, broadly ovate, vaulted in the median line.

Synonymy.—*Lambrus serratus* Milne Edwards, Hist. Nat. Crust., vol. 1, p. 357, 1834.

Lambrus lupoides White, List Crust. British Museum, p. 12, 1847.

Lambrus crenulatus Saussure, Mém. Soc. Phys. Hist. Nat. Genève, vol. 14, p. 429, pl. 1, figs. 4-4a, 1858.—Desbonne and Schramm, Crust. Guadeloupe, p. 21, 1867.—Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 129, 1871.—Gundlach and Torralbas, Ann. Acad. Habana, vol. 36, p. 301, text fig. on p. 303, 1899 (1900); reprint, p. 21, pl. 2, fig. 5, 1917.

Lambrus melanodactylus Desbonne, in Desbonne and Schramm, Crust. Guadeloupe, p. 21, 1867.

Platylambrus crenulatus Stimpson, Bull. Mus. Comp. Zoöl., vol 2, p. 129, 1871.

Platylambrus serratus A. Milne Edwards, Crust. Rég. Mex., p. 156, pl. 30, figs. 1 and 1c, 1878.

Lambrus granulatus Kingsley, Proc. Boston Soc. Nat. Hist., vol. 20, p. 150, 1879.

Parthenope (Platylambrus) crenulata Verrill, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 417, pl. 28, fig. 5, 1908.

Parthenope crenulata Verrill, *ibid.*, vol. 26, p. 155, text fig. 12, 1922.

Parthenope (Platylambrus) serrata Rathbun, Bull. 129, U. S. N. M., p. 516, pls. 180, 181, pl. 275, figs. 7-10, 1925.

Parthenope (Platylambrus) pourtalesii (Stimpson).

Plate 37.

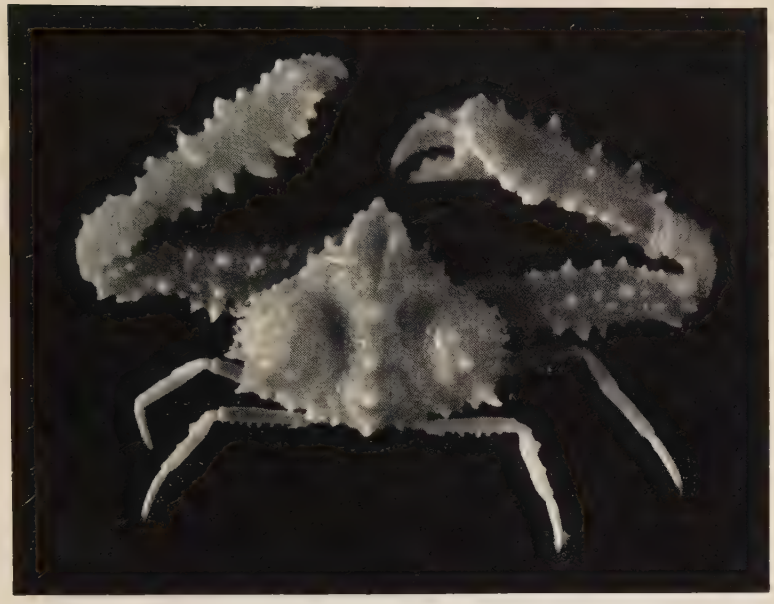
Name: This species was named in honor of Count Pourtales, associate of the elder Agassiz in the first deep-sea dredgings of the *"Blake."*

Diagnostic characters: Carapace ovate-triangulate with a strong lateral spine and another terminating the branchial ridge; branchial and hepatic ridges deeply separated from the gastro-cardiac, which are much elevated; a median row of sharp spines on the gastric, cardiac, intestinal regions and continued on the abdominal belt. Chelipeds with the upper surface elevated, spinous. Dactyli of ambulatories covered with velvety hairs.

Type: Taken by the *"Blake"* off Conch Reef, French Reef and American Shoal, 40 to 117 fms., types destroyed in the Chicago holocaust.

Distribution: From south of Martha's Vineyard, Mass., Lat. 40° 07′ N., Long. 70° 32′ W., southward in the course of the Gulf Stream to Florida, also off Havana, Cuba, and off Grenada, in depths ranging from shallow water to 150 fms.

Material examined: One male and one female dredged in 150 fms., seven miles off Alligator Reef, Florida, March 30, 1916, by the *"Ara,"* William K. Vanderbilt, commanding.



Parthenope (*Platylambrus*) *pourtalesii* (Stimpson), ×1.5.

COLOR: The body is sandy brownish with a distinct rose shading, according to the field-notes of Mr. Vanderbilt. Field-notes of the late John B. Henderson, 2nd, state that the claws are pinkish brown with a suggestion of banding.

TECHNICAL DESCRIPTION: Carapace widely, ovately triangulate, with the upper surface rough, the regions deeply delineated. The rostrum is a median triangulate tooth, deeply channelled on the upper surface, with a small tooth on either side of the median one above and slightly in advance of the eye; posterior to this there is a tubercle on the superior orbital margin which is approximately in line with the post-orbital angle which forms a prominent tooth; the anterolateral margins are cut into ten sharp, slightly unequal teeth, each of which is denticulate on the margins. The first one of these teeth is on the sharply defined hepatic region; the tenth tooth is at the lateral angle and is longer than the others; posterior to this at the end of the branchial ridge is another strong, acuminate, outward directed spine; the postlateral margin has three or four small spines and there are five on the posterior margin, of these the median is distinctly the largest. The hepatic region is sharply defined; the cervical groove is remarkably deep; the branchial region is elevated and separated by deep groove from the cardiac; there is a strong ridge running obliquely in from the strong branchial tooth and bearing two strong and several lesser spines and tubercles; other small tubercles and granulations occur on the branchial region and other parts of the carapace. The gastric, cardiac and intestinal regions are elevated; the rostral channel runs back onto the gastric region which bears three pairs of small tubercles and behind these one strong, up-pointing spine; posterior to and in line with this are another three similar spines, one on the summit of the cardiac region, one on the gastric summit which has posterior to it a smaller but distinct spine; the previously mentioned large median spine of the posterior margin is in line with the foregoing spines and followed by the produced triangulate median spine on the first and second abdominal segments, each of which has a line of small tubercles on either side of the median tooth. The third, fourth and fifth and sixth abdominal segments of the male also are ornamented with a single median spine, which, on the third and fourth segments is flanked with smaller tubercles. The pterygostomian region and subhepatic region bear a line of spinous tubercles inferior to the marginal spines.

The antennae are small, placed in the infra-orbital sinus.

The antennulae are prominent and fold obliquely within the fossett.

The calcareous covering of the eyestalk is produced into a tongue-like projection on the upper surface of the cornea; the latter is round, golden brown.

The external maxillipeds have the ischium of the endognath ornamented on the outer face with a median longitudinal channel, on either side of which is a row of spinous tubercles; the inner lateral margin of the ischium is serrate, the distal margin is emarginate; the merus is about three-fourths as long as the ischium and has the distal margin broadly rounded, its inner distal angle cleft for the insertion of the palp; there are two large spines on the merus in continuation of the outer row on the ischium, and several smaller spines; there are two large spines on the outer face of the first joint of the palp and one at the distal margin of the second joint; the third joint is characteristically small with two or three granulations on its outer surface and a brush of long setae on its inner and distal margins.

The chelipeds of the male are trigonal in cross section, slightly more than twice as long as the maximum width of the carapace; the merus has the upper surface elevated, granulose, with half a dozen tubercles of unequal size forming an approximately median row; the inner lateral margin is armed with seven triangulate, denticulate teeth; the outer lateral margin is armed with seven or eight similar teeth; the carpus has one or two spines on its outer margin and several on the upper surface; the propodus has the palm as long as the merus and the fingers almost half as long as the palm; the outer margin has eight or nine unequal, triangulate teeth, the inner margin has about seven teeth; the upper surface has a row of spinous tubercles; the lower finger has three or four teeth on the cutting edge and the curved upper finger is also continuously dentate; on the upper surface of the proximal part of the finger are two lines of convergent tubercles, continuations of those on the two upper margins of the propodus.

The ambulatories are very similar, slender, except that the first pair are smooth, while the second, third and fourth pairs have the meral joints spinous along the posterior lateral margin and also have a very few spines on the anterior lateral margin of the carpal and propodal joints; the dactyli have a fine pubescence and a very acuminate, horn-colored tip.

Leptodius floridanus (Gibbes). A, male; B, female; natural size.

SYNONYMY.—*Lambrus pourtalesii* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 129, 1871.—A. MILNE EDWARDS, Crust. Rég. Mexico, p. 149, pl. 30, figs. 2-2d, 1878.

Lambrus verrillii SMITH, Proc. U. S. Nat. Mus., vol. 3, p. 415, 1881; Rept. U. S. Fish. Comm. for 1885, p. 628, pl. 2, fig. 2, 1886.

Lambrus pontalesii (pourtalesi intended) GUNDLACH and TORRALBAS, Ann. Acad. Habana, vol. 36, text fig. on p. 302, 1899 (1900); reprint, pl. 2, fig. 4, 1917.

Parthenope (Platylambrus) pourtalesii RATHBUN, Bull. 129, U. S. Nat. Mus., p. 521, pls. 182, 183 and 276, 1925.

BRACHYNCHA.

Family: Xanthidae.

Genus: LEPTODIUS A. Milne Edwards.

Leptodius floridanus (Gibbes).

Plate 38, figs. A and B.

TYPE: This species was founded on material in the Charleston, S. C., Cabinet, brought from Key West, Fla., in numbers by Dr. Wurdemann in 1845 and later by Prof. W. H. Harvey.

DISTRIBUTION: Littoral from the Florida Reefs, southward through the West Indies and Bermudas, to Abrolhos Islands and Maceio, Brazil.

MATERIAL EXAMINED: One male and one female from Pigeon Key, Florida, April 19, 1923, collected by the *"Ara."*

TECHNICAL DESCRIPTION: Carapace about three-fifths as long as wide, with the anterolateral margins convex, toothed, the postlateral margins decidedly convergent, the posterior margin about as long as the interorbital region and with a flat carina. The frontal margin is composed of two wide truncated lobes, separated from each other by a narrow, V-shaped sinus and with the margin of each slightly sinuate and thickened, separated from the relatively inconspicuous preorbital angle by a clear-cut sulcus. The inferior preorbital angle forms a blunt tooth, visible dorsally; the postorbital angle is also a blunt tooth, well separated from the first anterolateral tooth by a sulcus; there is a small, subhepatic tooth visible below and between the postorbital and the first anterolateral tooth; there is one closed sinus on the inferior orbital border near the outer angle and vestiges of two closed

sinuses on the outer half of the superior border. There are four sharply defined teeth on the anterolateral margin besides the postorbital tooth. The first anterolateral tooth is slightly stronger than the postorbital tooth. The first anterolateral tooth is blunt, slightly stronger than the postorbital tooth; the second tooth is about one and one-half times as wide basally as the first, which it resembles in shape; the third anterolateral tooth is nearly as wide as the second but more acuminate towards the tip; the fourth tooth, situated at the lateral angle, is the most acuminate of the series and usually has a short median riblet running inward. Inside of and separated from each of the first three anterolateral teeth is a rough tooth-like lobe; there are also rough eminences in the postfrontal and mesogastric and anterior branchial regions; also transverse lines of fine granulations, especially on the gastric region. The regions of the carapace are sharply defined, the urogastric and cervical grooves being especially deep.

The chelipeds are unequal in the male, the left usually being the larger, equal in the female; the merus is trigonal, short, the carpus convex, with the upper surface rough with transverse granulae in lines, a sharp tooth at the inner angle; the palm is wider distally than proximally with the outer face convex, relatively smooth, except along the upper margin, where there is the semblance of a longitudinal groove; the fingers are black, two-fifths as long as the palm, spoon-tipped, each with two or three longitudinal grooves.

The ambulatories are slender, decreasing but little in length from the first to fourth pairs; each with the lateral margin heavily fringed; the dactyl long, slender, acuminate tipped.

The eye is small, set on a stocky stalk.

Synonymy.—*Chloridius floridanus* Gibbes, Proc. Amer. Assoc. Adv. Sci., vol. 3, p. 175, 1850.—Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 209, 1862.—S. I. Smith, Trans. Conn. Acad. Sci., vol. 2, p. 3, 1869.—Kingsley, Proc. Acad. Nat. Sci. Phila., p. 395, 1879.—Rankin, Ann. N. Y. Acad. Sci., vol. 11, p. 231, 1898.

Leptodius floridanus A. Milne Edwards, Miss. Sci. Méx., vol. V, pt. 1, p. 268, pl. 49, figs. 2-2a, 1880.—Rathbun, M. J., Proc. U. S. Nat. Mus., vol. 16, p. 536, 1893; Ann. Inst. Jamaica, vol. 1, p. 15, 1897; State Univ. Iowa, Bull. Lab. Nat. Hist., vol. 4, p. 270, 1898; Proc. Wash. Acad. Sci., vol. 2, p. 139, 1900; Bull. U. S. Bur. Fish., vol. 20, pt. 2, p. 27, 1901; State Univ. Iowa, Studies in Nat. Hist.,

Glyptoxanthus vermiculatus (Lamarck); female, natural size.

vol. 9, No. 5, p. 69, 1921; Bidjr. Dierk. Zoöl. Amsterdam, 23E Afl., p. 14, 1924.—Boone, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 22, 1927.

Genus: **GLYPTOXANTHUS** A. Milne Edwards.

Glyptoxanthus vermiculatus (Lamarck).

Plate 39, figs. A and B.

Diagnostic characters: Carapace broadly ovate, moderately convex in both directions, interorbital region slightly more than one-fifth of total width of carapace, rostrum a pair of short, broad, rounded horns, slightly separated; entire upper surface of carapace, chelipeds and legs deeply pitted and eroded.

Type: Lamarck founded this species on two specimens now in the Paris Museum; the locality of these specimens is unknown, but is believed by Dr. Alphonse Milne Edwards to be probably America.

Distribution: Rare in southern Florida and the West Indian region.

Material examined: One female taken in five fathoms, south of Catalina Creek, Cuba, February 14, 1924, by the *"Ara,"* William K. Vanderbilt, commanding.

Remarks: This is one of the most beautifully sculptured and colored of the West Indian crabs. It spends the greater part of its time quiescent in the crevices of the corals, which it so much resembles.

Technical description: Carapace broadly ovate, moderately convex in both directions. The interorbital region is slightly more than one-fifth of the total width of carapace; the rostrum consists of a pair of short, broad, rounded horns, close to each other, with a median groove running back to the gastric region, and with the frontal margin widely, roundly excavate, between the rostrum and the small, rounded, orbital tooth; the postorbital tooth is similarly inconspicuous. The anterolateral margin is broadly rounded and cut into four, wide, shallow lobes, by the three major grooves which traverse the hepatic-branchial regions; each lobe has its margin broken by the corrugations of the upper surface. The entire upper surfaces of the carapace, chelipeds and legs are deeply pitted and eroded. The cervical groove is deep and bifurcate, the anterior branch running forward and thence out across the hepatic lobe, the second groove traversing the branchial lobe to the lateral margin, sending out midway its length a short branch which runs forward and another which runs

almost direct backward, uniting with a long, traverse groove which extends from the margin of the cardiac region crookedly across the posterior branchial lobe. There is also a well-defined groove extending across the posterior region from side to side, separating the cardiac and intestinal regions. The postlateral margins are brief and deeply excavate, the fifth pair of legs, when retracted, fitting into the excavation; the posterior margin is relatively straight; the first and second female abdominal segments are visible dorsally; the remaining five segments are ventral, forming a broadly oval belt with a tapering tip. The lateral walls of the carapace against which the chelipeds and legs are closely applied, are smooth and are protected by a dense, felt-like pubescence; the external maxillipeds, sternum and ventral surfaces of the legs are eroded and pitted, as is the dorsal surface.

The basal antennal segment is corrugated, its outer distal angle extending to the infra-orbital sinus; the remaining joints are extremely rudimentary, less than one-fourth the width of the orbital cavity.

The antennulae fold obliquely within the fossett beneath the rostral hood.

The pterygostomian region is eroded, as is the upper surface of the carapace.

The external maxillipeds have the ischium of the exognath produced as far forward as the external distal angle of the merus of the endognath; the ischium of the latter is subrectangular, with its distal margin uneven; there is a deep, submedian, longitudinal groove on its outer face; the merus is three-fifths as long as the ischium, its distal margin obliquely truncate, except for the inner distal angle, which is slightly excavate for the reception of the palp; the outer face of the merus and basal article of palp are eroded.

The female chelipeds are equal, closely applied to the sides of the body, the merus short, curved, much flattened laterally, only eroded on its distal, dorsal surface; the carpus is elongated on the upper surface, nearly as long as the merus and rounded and deeply eroded; the propodus is short, its height equalling the length of the palm on the lower margin, while its upper margin is only three-fifths as long as the lower; the upper finger is deflected, one-third longer than the upper margin of the palm, with three longitudinal ridges, separated by grooves, on the outer face; the cutting edge armed with six white teeth; the lower finger is stockier than the upper, has two longitudinal ridges, separated by a groove, on its upper face and five large, white

A.—*Heteractea lunata* (Milne Edwards and P. S. Lucas). B.—*Lobopilumnus agassizii* (Stimpson), natural size.

teeth, of which the second from base is much the largest; the fingers interlock closely, without gaping.

The ambulatories are slender, the meral joint especially compressed laterally, relatively smooth, fitting closely upon those of the adjacent legs, except that of the fifth leg, which is eroded on the exposed upper surface; the carpal joint is not half as long as the meral, flattened on its inner or anterior lateral surface, its upper and outer surface rounded and deeply eroded; the propodus is shorter than the carpus, nearly square, its upper surface deeply eroded; the dactyl is one-third longer than the propodus, much slenderer, yet stocky, tapering, with a very sharp, brown, claw-like tip. The lateral margins of the legs are fringed with fuzzy setae, as are also the sidewalls of the carapace.

SYNONYMY.—*Cancer vermiculatus* LAMARCK, Hist. Anim. sans Vert., vol. 5, p. 271.

Xantho vermiculatus H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 391, 1834.

Glyptoxanthus vermiculatus A. MILNE EDWARDS, Miss. Sci. au Méx. et dans L'Amerique Centrale, t. V., p. 255, pl. 43, fig. 2, 1881.

Genus: **HETERACTEA** Lockington.

Heteractea lunata (Milne Edwards and Lucas).

Plate 40, fig. A.

DIAGNOSTIC CHARACTERS: The only West American species of the genus so far known, with the outer and upper faces of the chelipeds covered with large, rounded tubercles set in a dense pilosity; the anterior part of the carapace also with pilosity.

TYPE: The type was taken at Valparaiso, Chile, and is deposited in the Paris Museum.

DISTRIBUTION: Known from the tidal zone, from San Diego, California, to Chile.

MATERIAL EXAMINED: One ovigerous female, probably seined at Punta Arenas, Costa Rica, March, 1928, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace widest anteriorly, 12 mm. long, 15 mm. wide across the gastric region; interorbital width 6 mm.; frontal margin and superior orbital margin forming a conspicuous

thickened ridge, with only the indication of a median sulcus in the frontal margin and at the preorbital angle; on the outer half of the superior orbital margin there is a very faint unevenness, indicating two entirely closed sinuses. The inferior orbital tooth is well developed. The anterolateral margin is wide, convex, cut into four teeth, in addition to the preorbital tooth, which is bluntly truncated and almost entirely fused with the second tooth; the third, fourth and fifth teeth are more sharply defined with acuminate tips and slightly decreasing in size posteriorly; the postlateral margins are decidedly convergent; the posterior margin straight, slightly thickened. There is a distinct pit on either side of the cardiac region and the cervical groove is well delineated. The dorsal surface of the carapace is moderately convex longitudinally and covered with a dense fur-like pilosity, except for a narrow bare space on the extreme anterior region, paralleling the frontal and orbital margins. The postlateral walls of the carapace are very high, oblique.

The eyestalk is stocky, constricted below the cornea and produced into a tongue-like projection tipped with a double tubercle on the upper surface of the cornea and another on the frontal border; the cornea is large, spherical, terminal, shining black.

The antennulae have the basal article much enlarged, the second and third articles subequal, clavate, the biarticulate flagellum with one large and one smaller branch. The free articles fold transversely within the fossett, which is divided medially.

The antennae have the basal article small, stocky, lodged between the antennular base and the preorbital angle and not reaching to the superior frontal border; the second articles lies in the orbital sinus and barely touches the frontal margin; the third article is slightly smaller than the second, and the flagellum consists of about 22 rings and is slightly longer than the long diameter of the orbit.

The external maxilliped has the exognath extending to the tip of the merus; the ischium is rectangular, twice as long as wide, with the distal margin excavate; the merus is squarish, with the outer distal angle acute-angled and slightly produced; the inner angle is slightly obliquely truncated for the reception of the stocky three-jointed palp.

The chelipeds are equal in the female, unequal in the older males. The merus is short, closely appressed to the carapace; the carpus is very long, convex on the upper surface; the palm is large, convex on the outer face, about one-third larger than the carpus and three-fourths as high as long, with the outer face convex; the upper and

Lophopanopeus heathii Rathbun, × 1.5.

outer faces of the carpus and propodus have numerous large, rounded tubercles and are also covered with a short, thick pilosity. The lower finger is short and thick, with an acute tip and two additional teeth on the cutting edge; the upper finger is bare of setae and is more curved than the lower.

The ambulatories are similar, long and slender and covered with a dense pilosity, the dactyli have an acuminate, horn-colored tip.

The female described is carrying an egg-mass three-fourths as large as the body and composed of minute golden eggs attached to the hairs of the abdominal appendages.

SYNONYMY.—*Pilumnus lunatus* MILNE EDWARDS and LUCAS in D'ORBIGNY'S Voyage dans l'Amerique Meridionale, Crustacea, vol. 6, part 1, p. 20, pl. 9, 1843; pl. 9, atlas, 1847.—GAY, Historia de Chile, Crust., vol. 3, p. 143, 1849.—STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 216, 1860.

Heteractea pilosus LOCKINGTON, Proc. Calif. Acad. Sci., vol. 7, p. 97, 1876 (1877).—STREETS and KINGSLEY, Bull. Essex Inst., vol. 1, p. 106.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 396, 1879 (1880).

Heteractea lunata A. MILNE EDWARDS, Crust. Rég. Mex., vol. v, p. 301, pl. 52, fig. 2, 1880.—RATHBUN, Harriman Alaska Expedition, Crust., vol. 10, p. 185, 1904.—SCHMITT, Univ. Calif. Publ. in Zoöl., vol. 23, p. 248, pl. 37, fig. 9, 1921.

Genus: **LOPHOPANOPEUS** Rathbun.

Lophopanopeus heathii Rathbun.

Plate 41.

TYPE: The type was collected in Monterey Bay, California, and is deposited in the United States National Museum.

DISTRIBUTION: Monterey Bay and Laguna Beach, California. Puerto Refugio, Angeles Island, L. C. and J. San Jose Island, L. C. The *"Ara"* material substantially extends the southern range of this species, and establishes the first Costa Rican record for it.

MATERIAL EXAMINED: One male and one female, Punta Arenas, Costa Rica, March, 1928, collected by the *"Ara."*

COLOR: Quite variable, according to all authors. The Costa Rican

specimens are dark red with blackish fingers, the tips pearly white; under side of body and legs near bases creamy.

TECHNICAL DESCRIPTION: Carapace hexagonal, dorsal surface smooth, except on the hepatic regions, which are slightly roughened; cervical and urogastric grooves well defined; frontal margin slightly oblique, with the outer angles obscure; the postorbital and first lateral tooth completely coalesced; the second and third teeth prominent and subequal; the fourth tooth much smaller than the preceding. The chelipeds have the carpus nearly smooth; the propodus smooth, with one tooth on the inner side of the upper margin; the fingers slightly curved, blackish, this color not extending upon the palm. The ambulatories have the carpal joints slightly bilobed on the upper margin; the propodal joints have slightly convex anterior margins; the dactyli are stout with sharp nails.

SYNONYMY.—*Lophopanopeus heathii* RATHBUN, Amer. Nat., vol. 34, p. 137, 1900; Crust. Harriman Alaska Exped., vol. 10, p. 182, pl. 7, fig. 9, 1910.—WEYMOUTH, Stanford Univ. Publ. Univ. Ser., No. 4, p. 51, pl. 12, fig. 38, 1910.—HILTON, Journ. Entom. Soc. Pomona Coll., vol. 8, p. 71, 1916; SCHMITT, Univ. Calif. Publ. Zoöl., vol. 23, pl. 37, fig. 6, 1921.

Subfamily: **Menippinae.**

Genus: **MENIPPE** De Haan.

Menippe mercenaria (Say)

Plate 42.

NAME: Southern stone crab.

DIAGNOSTIC CHARACTERS: Large, with huge chelae; shell very heavy, mottled moss green, fingers tipped with black.

TYPE: Say's type description merely states that the species inhabits the southern States. A further note that it is sold in the Charleston, S. C., market, might possibly indicate that his type was so obtained. It was originally deposited in the Philadelphia Academy of Natural Sciences.

DISTRIBUTION: West Indian region. Inhabits holes in the coral rocks during the day and does most of its foraging at night.

MATERIAL EXAMINED: One specimen, taken in the Bay Biscayne, Miami, Florida, March, 1923.

Menippe mercenaria (Say), about two-fifths of natural size.

HABITS: So secretive is this crab during the shedding stage that a soft-shell specimen, or cast shell, is practically unknown. It is commonly believed by the fishermen of the West Indian region that this crab does not shed. So hard and strong is the shell, that not infrequently several strong blows with a hammer will be required to break it. The meat of this crab has the most delicious flavor of all the Southern crustacea, and the crab is therefore much sought by fishermen who obtain it by baited lobster pots, or by spearing it in coral rock crevices.

According to Hay and Shore, the first post-larval stages of the young crabs spend their time in deeper water among the pebbles, coming into shallower water when about an inch long. This observation was made at Beaufort, N. C., a rather northern range for the species. May it not be possible that in more southern waters the young do not seek such depths?

COLOR: In life the crab is a rich translucent green, mottled with grayish-green spots and with minute flecks of blackish-gray on the upper surface. The underside is creamy white. The tips of the claws are black.

TECHNICAL DESCRIPTION: Carapace transversely oval, longitudinally convex; frontal border about one-fourth the width of carapace, prominent, divided into two lobes on each side; the inner pair are the more prominent, rounded. The anterolateral margin is wide and regularly convex, cut into five teeth, including the postorbital; of these, the postorbital is the shortest, the second, third and fourth are wide and blunt; the fifth tooth is at the lateral angle and is short, prominent, its postlateral margin confluent with the posterior margin of carapace, which is but little convex, converging obliquely posteriorly; the posterior margin is short, not quite straight. The regions of the carapace are weakly delineated. The gastric region has two low, rounded lobes and the anterior branchial region is also slightly lobed. There is a definite sulcus on each side of the cardiac region and an arcuate line of coarse pits on the branchial region. The upper surface of the carapace is relatively smooth, with numerous coarse, pore-like pits irregularly scattered. There are three well-marked, closed sinuses on the outer half of the superior orbital margin. The superior and inferior inner orbital angles are both well defined, nodular. The male abdominal belt is rather broad, seven-segmented; the female belt is also seven-segmented.

The eyestalk is short, stocky, with a tongue-like projection on the upper surface of the cornea which is small, spherical, terminal.

The antennulae fold almost transversely.

The antennae have the basal article short, not touching the frontal edge; the second joint barely reaching the front, the flagellum long, fine, situated in the orbital hiatus and extending about to the anterior margin of the first lateral tooth.

The chelipeds are slightly unequal in both sexes, very massive; the merus is short, thick, the carpus smooth, convex, with a prominent blunt tooth at the inner angle; the propodus is very massive with the outer face smooth, convex, its height equal to two-thirds the length of the carapace and its length, including the dactylus, is slightly greater than the length of the carapace; the fingers are approximately as long as the palm, curved, pointed, the lower finger of the larger claw with a large, trinoduled basal tooth; the outer half of the finger is very black.

The ambulatories are comparatively slender, the merus about as long as the carpus and propodus taken together; the distal half of the propodus and the entire dactyl have a dense tuft of short setae on the upper lateral margin; the tip of the dactyl is sharp, horn-colored toe-nail, which enables the crab to obtain a purchase in scrambling over the rocks.

SYNONYMY.—*Cancer mercenaria* SAY, Jour. Acad. Nat. Sci. Phila., vol. 1, p. 448, 1818.

Xantho mercenaria H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 399, 1834.

Pseudocarcinus mercenarius GIBBES, Proc. Amer. Asso. Adv. Sci., vol. 3, p. 176, 1850.

Menippe mercenaria STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 53, 1859.—COUES, E., and YARROW, H. C., Proc. Acad. Nat. Sci. Phila., vol. 30, p. 120, 1871; KINGSLEY, *idem.* vol. 30, p. 318.—A. MILNE EDWARDS, Miss. Sci. au México, Tome V, p. 262, pl. 67 and pl. 68, fig. 3, 1880.—HAY and SHORE, Bull. U. S. Bur. Fish., vol. 30, p. 439, pl. 35, fig. 8, 1918.

Genus: **CARPILIUS** Leach.

Carpilius corallinus (Herbst).

Plate 43.

DIAGNOSTIC CHARACTERS: Carapace wine-red maculated with venations of light yellow in all directions; oval, evenly convex in all direc-

Carpilius corallinus (Herbst), one-half of natural size.

tions; one blunt tooth at the lateral angle; frontal margin bent down almost vertically, median lobe wide, truncate, separated from the small lateral lobes by a wide, U-shaped notch. Chelipeds rather massive.

TYPE: Herbst's type came from the Carolina coast of the United States and is deposited in the Berlin Museum.

DISTRIBUTION.—Known from Miami, Florida, southward in the Bahamas, Porto Rico, West Indies, to Brazil, at Goyanna, Stone Reef and Fernando Noronha. A reef-dwelling species.

MATERIAL EXAMINED: One species taken at Cape Haitien, Haiti, March, 1928, by the "*Ara*," William K. Vanderbilt, commanding. Color plate made of this specimen by W. E. Belanske. One specimen taken at Turtle Harbor, Florida, 1923.

COLOR: Mr. Belanske's color sketch, which is the first authentic sketch of this species made from the living animal, shows the upper surface of the carapace ruby red, marbled with yellow. The tips of the chelipeds are brownish-black, as are also the dactyli of the ambulatories.

TECHNICAL DESCRIPTION: Carapace oval, regularly convex in all directions; the interorbital margin is less than one-third the width of the carapace; the frontal margin deflected almost vertically; the median tooth wide, truncated and separated from the lateral lobe by a wide, U-shaped sinus; the lateral lobe is small, rounded, its margin thickened; the superior orbital margin is entire, thickened, forming a well-defined, blunt tooth at the postorbital angle. The anterolateral margins are wide and broadly and evenly convex, a prominent, blunt tooth occurs at the lateral angle, the postlateral margins are obliquely convergent; the posterior margin is straight. The male abdominal belt is five-segmented; the third and fourth segments being entirely fused without even a suture line; the fifth segment is fused immovably with the fourth but retains a suture line indicating the fusion. The female belt is seven-segmented.

The eyestalk is stocky, short, the cornea small, terminal.

The antennulae fold obliquely within the fossett.

The antennae have the basal articles flat, long, extending into an oblique cleft between the frontal margin and the infraorbital plate; the flagellum is small, equal to less than the length of the orbit and situated in the orbital cleft.

The external maxillipeds have the distal border decidedly oblique.

The chelipeds are massive but less so than those of *M. mercenaria.* They are slightly unequal in both sexes of *Carpilius corallinus;* the merus is stocky; the carpus nodular, convex, without a tooth at the inner angle; the propodus is two-thirds as high as long, stocky; the lower finger is stocky, with a molariform, sub-basal tooth, the finger tip-pointed; the hinged finger has a similar molar tooth but has its tip more curved.

The ambulatories are stocky, the meral joint the longest; the carpus and propodus short, subequal, the dactyl longer than the propodus, slenderer, with an acuminate brown tip, longitudinally grooved on each lateral face.

SYNONYMY.—*Cancer corallinus* HERBST, Natur. Krebben u. Krebse, t. I, p. 133, pl. 5, fig. 40, 1782.—FABRICIUS, Ent. Syst., t. II, p. 445.—DESMAREST, Consid. gen. Crust., p. 103, 1802.

Carpilius corallinus LEACH, in DESMAREST, *op. cit.*, p. 103.—H. MILNE EDWARDS, Hist. Nat. Crust., t. I, p. 381, 1834.—A. MILNE EDWARDS, Nouv. Arch Mus., t. I, p. 216.—GUÉRIN, Crust. de l'ile de Cuba, p. 10, 1856.—DESBONNE and SCHRAMM, Crust. de la Guadeloupe, p. 26, 1867.—A. MILNE EDWARDS, Miss. Sci. Méx., t. V, p. 239, 1880.—M. J. RATHBUN, Ann. Inst. Jamaica, vol. 1, No. 1, p. 12, 1879.—State Univ. Iowa Bull. Labr. Nat. Hist., vol. 4, p. 262, 1898.—Bull. U. S. Bur. Fish., vol. 20, pt. 2, p. 25, 1901.—Rapport betreffende een voorloopig onderzuk naar den toestand van de Visscherij en de Industrie van Zeeproducten in der Kolonie Curaçao, pt. 2, p. 334, 1920.—Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, 23E Afl., p. 14, 1924.

Genus: **LOBOPILUMNUS** A. Milne Edwards.

Lobopilumnus agassizii (Stimpson).

Plate 40, fig. B.

NAME: This species was named in honor of the elder Agassiz.

TYPE: The type "was taken in from 5 to 7 fms. between East and Middle Keys, Tortugas, and East of the Tortugas in 13 fms."

DISTRIBUTION: Southern Florida, Gulf of Mexico, off Yucatan, Sombrero, Caribbean and the variety *bermudensis* at the Bermudas. The "*Ara*" specimen establishes the first Cuban record of the species.

MATERIAL EXAMINED: One male taken in dredge, south coast of Cuba, February 19, 1923, by the *"Ara,"* William K. Vanderbilt commanding.

TECHNICAL DESCRIPTION: Carapace suboval, nearly subcircular, 23.4 mm. long, 28 mm. greatest width, frontal margin 8.5 mm. wide; moderately convex longitudinally, slightly so transversely; dorsal surface covered with coarse, irregular granules which are more prominent anteriorly and on the branchial region, and with numerous, stiff, long, club-like setae. The frontal margin is approximately equal to one-third of the greatest body width and is divided into two pairs of lobes, the very wide, submedian pair which are separated from each other by a deep, narrow channel and have about six, stout, blunt conical teeth or spines on the frontal margin of each lobe. The smaller, outer pair of lobes are narrow and separated from the inner pair by a deep sinus and consist of two conical teeth; this outer lobe is separated from the preorbital spine by a V-shaped sinus. The preorbital spine is a sharp, conical tooth; the superior orbital margin is armed with about eight irregular teeth, the postorbital spine is acute; the inferior orbital margin is armed with 8 or 9 coarse, sharp teeth which are visible dorsally; the three nearest the inferior inner orbital angle are especially large and prominent and protruding and have several coarse, spine-like granules on their outer basal surface. The anterolateral margin is armed with four primary teeth; of these, the first, or preorbital tooth, is bifid, consisting of two conical spines separated by a wide U-shaped sinus; the second tooth is well separated from the first and is trifid, consisting of a large, forward-curved tooth which has a secondary tooth on its anterior margin, also one on its posterior margin, also a denticle-like tubercle at its posterior base; the third tooth consists of a strong, forward-curved spine which has one to three regularly placed tubercles on its proximal margins. The fourth lateral spine is well separated from the third, which it closely resembles. The postlateral margins are convergent; the posterior margin is keeled. The urogastric and cervical grooves are deeply impressed; another groove extends back in the median line from the frontal margin onto the gastric region and bifurcates, uniting with the cervical groove. A groove circumscribes the orbit. The pterygostomian region is granulate; there is a prominent subhepatic, bifid tubercle. The male abdominal belt is narrow, seven-segmented.

The antennulae have the basal article greatly enlarged; the free articles fold transversely, a little obliquely within the fossett.

The antennae has the basal article fitted within the infra-orbital sinus, the tapering flagellum being scarcely equal in width to the long diameter of the orbit.

The external maxillipeds have the exognath extending to the distal angle of the merus; the ischium is rectangular with the distal margin slightly sinuate, a longitudinal groove on its outer face; the merus is about half as long as the ischium, with the inner distal margin slightly produced; the distal angle truncated for the reception of the palp, the inner lateral margin a little oblique.

The eye has a short, stocky stalk, constricted medially; the cornea is small, terminal.

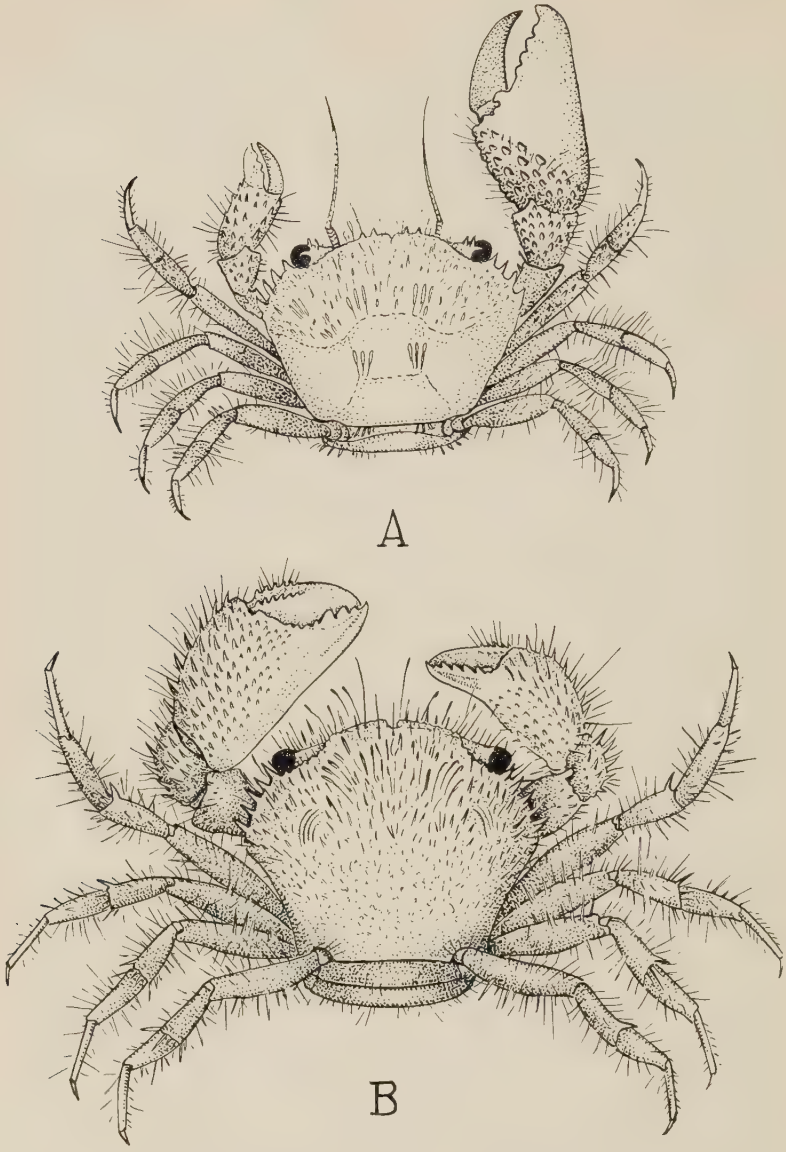
The chelipeds are decidedly unequal in the male; the merus has a decided transverse groove subdistally on the upper surface; its upper lateral margin is granulate proximally, dentate distally, an acute subdistal and a distal tooth; the carpus is large, round, convex, the upper surface covered with sharp spines, an especially long one occurring at the inner lateral angle. The large cheliped has the palm one and one-half times as high as that of the smaller cheliped; both palms have the upper and outer surface moderately convex and covered with approximately longitudinal rows of denticle-like tubercles, those along the upper margin being quite sharp, while the lower ones are more rounded. A few denticles occur on the base of the upper fingers. The fingers are deep brownish-black, the color not extending upon the palm. Each finger has three or four large teeth; the fingers fit closely with down-curved tips.

The ambulatories are moderately stout, the last pair much shorter than the other three pairs. The distal part of the meral, the carpal and the proximal part of the propodal joints are set with a row of sharp spines, the dactyli are long, slender, sharp-tipped. All of the ambulatories are covered with long, stiff, ocher-yellow setae.

Synonymy.—*Pilumnus agassizii* Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 142.

Lobopilumnus agassizii A. Milne Edwards, Miss. Sci. Méx., vol. 5, p. 298, pl. 52, fig. 4, 1880.—Rankin, Ann. N. Y. Acad. Sci., vol. 12, p. 529, 1900.

For the subspecies, *L. agassizii* var. *bermudensis* Rathbun, and synonymy, see Boone, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 23, 1927.



A.—*Micropanope spinipes* A. Milne Edwards, ×5, West Indies. B.—*Pilumnus spinifer* A. Milne Edwards, ×5, Mediterranean Sea.

Genus: **MICROPANOPE** A. Milne Edwards.

Micropanope spinipes A. Milne Edwards.

Plate 44, fig. A.

DIAGNOSTIC CHARACTERS: Anterolateral margins armed with four acute, spine-like teeth, frontal margin more than half the width of the carapace; chelipeds unequal in the male; carpus entirely and the proximal upper diagonal half of the outer face of the palm set with rows of sharp spines; lower outer diagonal half of palm smooth. Small cheliped with outer face of palm entirely covered with longitudinal rows of sharp spine. Brown coloration of fingers not extending upon the palm.

TYPE: The *"Hassler"* Expedition secured the type, a female, at Abrolhos Islands, Brazil, in 30 fms. It is deposited in the Paris Museum.

DISTRIBUTION: A rather rare species known from Abrolhos Islands, Brazil, and two specimens taken in Bermuda. The *"Ara"* material establishes the first Cuban record of the species.

MATERIAL EXAMINED: Five specimens from Cualo Reales Channel, Cuba, February 18, 1923, collected by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace 7 mm. long, 10 mm. maximum length; frontal margin 5 mm. wide, incised in the median line and armed with spines along the margin. Carapace roughly hexagonal, decidedly convex longitudinally, a distinct groove running back from the median front onto the gastric region; urogastric line deep, a short longitudinal groove at either end of it. Anterior three-fourths of the carapace bristling with long, stiff setae, as are also the chelipeds and ambulatories. Posterior fourth of carapace relatively smooth, punctate. The frontal margin is armed with eight or ten spines; the superior orbital margin is armed with a row of sharp spines; the inferior orbital margin is also set with a row of sharp spines; several of which show in a dorsal view. The anterolateral margin is armed with four acute, slightly forward-directed, widely spaced, horn-color spines, including the postorbital spine. The posterolateral margins are longer than the anterolateral, and converge posteriorly; the posterior margin is wide and slightly convex. The male abdominal belt

is seven-segmented, narrow, the tip triangulate. The female is seven-segmented, wide, oval. One female is carrying about 300 eggs.

The eyestalk is stocky with a tongue-like projection on the upper surface of the cornea and tufted with setae; the cornea is set obliquely at the end of the stalk and is slightly larger than the stalk.

The antennulae and antennae offer no specific characters.

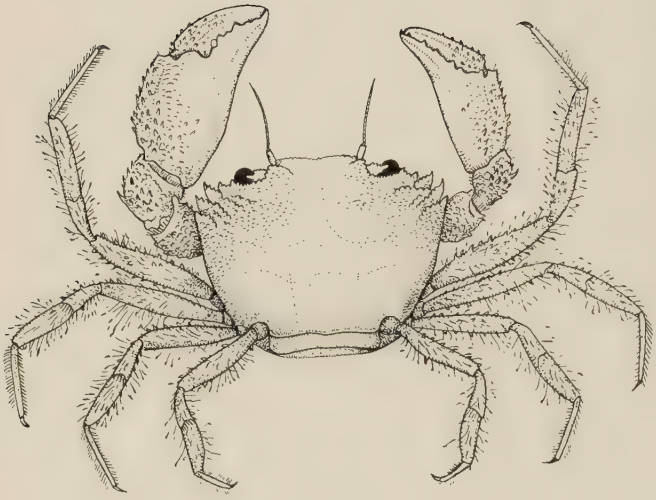
The male chelipeds are markedly unequal, the larger one having the palm one and one-half times as high as the smaller. Each has the merus three-sided, closely appressed to the body, its distal end armed with two or three spines and scarcely visible beyond the carapace; the carpus is large convex dorsally, with a blunt inner lateral angle, the upper surface covered with coarse spines; the outer and upper surface of the palm of the small cheliped is covered with longitudinal rows of acute spines, a few of these smaller spines occur on the base of the upper finger. The palm of the large cheliped is armed on its upper and proximal half with rows of spines; these rows shorten diagonally, the distal lower diagonal half of the palm being smooth. The fingers are dark brown, the color not extending upon the palm; slightly deflected; the proximal finger stouter than the upper finger, which is more curved, both dentate; the fingers of the smaller chelipeds meeting along the cutting edge, those of the larger claw with an elliptical gape, only the tips meeting. The female chelipeds are also decidedly unequal.

The ambulatories are rather slender, with the meral, carpal and propodal joints setose and spinulose on the anterolateral margins; the dactyli are long, subcylindrical, with very acuminate tips.

Synonymy.—*Micropanope spinipes* A. Milne Edwards, Miss. Sci. Méx., t. V, part 1, p. 326, pl. 54, figs. 3-3c, 1879; Bull. Mus. Comp. Zoöl., vol. 8, p. 13, 1880.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, p. 323, 1923.

Pilumnus spinipes Rathbun, Bull. Labr. Nat. Hist. Univ. Iowa, vol. 4, p. 264, 1898.—Verrill, Trans. Conn. Acad. Arts and Sci., vol. 5, p. 577; *ibid.*, vol. 13, p. 361, text fig. 20, pl. 26, fig. 1, 1908.

Pilumnus andrewsi Rathbun, Bull. Labr. Nat. Hist. State Univ. Iowa, vol. 4, p. 266, pl. 5, fig. 2, 1898; Proc. Wash. Sci., vol. 2, p. 139, 1900; Bijdragen tot de Dierkunde, natura artis magistra te Amsterdam, 23E Afl., p. 16, 1924.



Pilumnus brasiliensis Miers, × 4.

Genus: **PILUMNUS** Leach.

Pilumnus brasiliensis Miers.

Plate 45.

TYPE: A female taken by the "*Challenger*," near Bahia, Brazil, in 7 to 20 fms., and deposited in the British Museum.

DISTRIBUTION: Rare. Brazil; Porto Rico, at four "*Fish Hawk*" stations off Vieques, 6 to 16 fms., off Culebra, 16 fms.; Haiti.

MATERIAL EXAMINED: One female taken at Carenge Bay, Le Mole, Haiti, February 4, 1924.

TECHNICAL DESCRIPTION: Carapace moderately convex longitudinally, 15 mm. long in the median line, 20 mm. maximum width; the frontal margin is slightly more than one-third of the carapace total width, consisting of a pair of wide, slightly rounded denticulated submedian lobes, separated by a shallow sulcus, from which there runs back on the carapace a median groove. The preorbital angle is represented by a well-defined tooth; the superior orbital margin is unevenly denticulated or spinose. There is a sharp, acute tooth at the postorbital angle. The anterolateral margin bears three acute, forward-directed teeth in addition to the postorbital tooth. The regions of the carapace are well defined, especially the urogastric line. The dorsal surface of the carapace is microscopically granulate and is covered with stiff, short setae. The posterior margin of the carapace is marked by a flat carina. The female belt is wide, oval, ciliated along the margins.

The eye has a rather long, granular, calcareous stalk which has a tongue-like projection on the dorsal surface of the cornea; the latter is large, spherical, black, terminal.

The chelipeds are moderately unequal in the female, the left being the larger; the merus is decidedly trigonal, spinulose along the lateral margins, with a distinct sharp tooth at the upper distal angle; the carpus has the convex upper surface covered with sharp spines interspersed with coarse granules and stiff setae; the palm is moderately convex on the outer surface, about three-fifths as high as long, and covered with coarse spines arranged in longitudinal rows, granules and setae as on the carpus; along the upper lateral margin of the palm the spines are larger. The fingers have deep setose grooves between the longitudinal ridges which latter are granulose.

The ambulatories are long, well-developed, slightly granulose, setose along the lateral margins, the dactyli long, slender, with a horny tip.

SYNONYMY.—*Pilumnus brasiliensis* MIERS, Rept. Voy. *"Challenger"* Zoöl., vol. 17, p. 15, pl. 13, fig. 2, 1886.—RATHBUN, Bull. U. S. Nat. Mus., vol. 20, pt. 2, p. 40, 1901.

Pilumnus spinifer H. Milne Edwards.

Plate 44, fig. B.

DIAGNOSTIC CHARACTERS: Carapace nearly as long as wide; frontal margin wide; anterolateral margin armed with five sharp spines, both orbital margins spinose. Chelipeds unequal in both sexes; the carpus entirely and the upper three-fourths of the outer face of the palm set with long, sharp spines, approximately set in rows and those on the upper margin much longer than those lower down. Smaller cheliped with entire outer face of palm bristling with sharp spines and setae; fingers strongly grooved.

TYPE: Collected in the Mediterranean and deposited in the Paris Museum.

DISTRIBUTION: Mediterranean Sea but not the Adriatic; also found on the coasts of North Africa.

MATERIAL EXAMINED: One specimen dredged in 100 fms., 9½ miles E. by S., ½ S. from Cape Bon Tunis, North Africa, January 19, 1927, by the *"Ara."*

TECHNICAL DESCRIPTION: Carapace 10 mm. long, 12.6 mm. maximum width; frontal margin 5 mm. wide; incised in the median line, spinulose along the margin. Inferior and superior orbital margins set with sharp spines; subhepatic region also with the small spines below the anterolateral spines. Anterolateral spines five, all very long and acuminate, the third and fourth spines being slightly longer than the second and fifth spines. Carapace decidedly convex, especially on the anterior half; delineation of the regions obscure; upper surface thickly set with long, apparently hollow, stiff, red-brown setae, as are also the chelipeds and ambulatories. The female abdominal belt is seven-segmented, widely oval, heavily fringed with setae along the lateral margin.

The eyestalk is stocky, calcareous; the cornea terminal, large spherical.

The antennulae and antennae afford no specific characters.

The chelipeds are markedly unequal in both sexes; the merus short, trigonal, the upper and lower lateral margins spinose; the carpus is

A.—*Pilumnus floridanus* Stimpson, ×4.

convex and entirely covered on the upper surface with long, acute spines, interspersed with stiff setae; the larger palm is moderately convex on the outer surface. widest at the base of the fingers and covered on the upper two-thirds of the outer face with spines, larger on the upper margin and dwindling in size below. These rows of spines taper off diagonally toward the base of the propodus, the lower part of the palm being smooth; on the smaller palm the entire outer surface is covered with spines. The propodal fingers are thick, grooved longitudinally and the smaller one armed proximally with spinules, the cutting edge of each with four strong teeth. The hinged fingers are more curved, each with many spinules proximally; the tips of the fingers acute.

The ambulatories are long, slender, very hairy along the lateral margins; the anterior distal angle of each the meral and carpal joints armed with an acute spine; the dactyli long, acuminate tipped.

SYNONYMY.—*Pilumnus spinifer* H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 420, 1834.—LUCAS, Explor. Sci. de l'Algérie, Zoöl., vol. 1, p. 12, 1849.—HELLER, Die Crustaceen des Sudlichen Europa, p. 73, 1863, Wien.

Pilumnus floridanus Stimpson.

Plate 46.

DIAGNOSTIC CHARACTERS: Carapace narrower than that of the nearly related species, *P. aculeatus.*

TYPE: The type was found at the Tortugas by the *"Blake"* Expedition and was deposited in the U. S. National Museum, but is probably destroyed.

DISTRIBUTION: A reef dweller from the Bahama Banks and Tortugas southward to Curaçao. The *"Ara"* material appears to be the first record of the species from Cuba.

MATERIAL EXAMINED: One specimen dredged in 3 fms., Cape Cruz, Cuba, February 11, 1924.

TECHNICAL DESCRIPTION: Carapace but little convex, 8 mm. long, 10 mm. wide, frontal margin 6 mm. wide, without dentition, slightly incised in the median line; a wide, prominent, convex lobe on either side of this incision; outer half of the superior orbital margin with three spine-like teeth, inferior orbital margin with eight or nine well-developed teeth, the two nearest the infra-orbital angle being the most prominent. The anterolateral margin is short and is armed with four

subequal and subequally spaced, acuminate, up-pointing teeth, including the postorbital tooth. The postlateral margins are one and one-half times as long as the anterolateral and are abruptly convergent. The posterior margin is straight, about as wide as the interorbital region. There is a strong fringe of clavate setae across the frontal margin, almost obscuring it. There are also numerous other spinose and clavate setae on the anterior half of the carapace and a few shorter ones on the posterior half. The urogastric, cervical and median frontal grooves are but slightly defined. There is a weakly developed subhepatic tubercle and the pterygostomian region is smooth, tumid. The female abdominal belt is oval, seven-segmented, heavily fringed on the lateral margins with setae. The specimen under discussion carries about 500 eggs.

The antennulae have a large basal article and the two free articles are clavate, folding transversely beneath the frontal border.

The antennae have the fused basal article in the infra-orbital sinus, its inner distal angle touching the down-bent point of the frontal margin; the second and third peduncular articles are small, the multiarticulate antennae is slightly longer than the long diameter of the orbit.

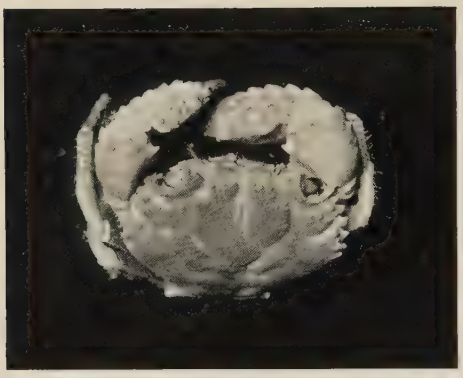
The eyestalk is of moderate size, slightly constricted on the outer face, produced distally on the dorsal surface, projecting above the cornea; the latter is deep brown, subspherical.

The external maxillipeds have the ischium rectangular, its distal margin slightly sinuate; the merus squarish, with its outer distal angle truncated for the reception of the palp.

The chelipeds are decidedly unequal in both sexes; the merus is short, its upper margin granulose; the carpus is elongate, convex on the upper surface and covered with sharp spines one of which accentuates the inner angle; the propodus of the small claw has the entire upper and outer surface covered with rows of spine-like tubercles; the large palm also has these tubercles on the upper and outer two-thirds, but on the proximal third of the outer face they become obsolete, it being smooth. The fingers are deep brown, the color not extending upon the palm. The upper finger of the large palm has a few spinose tubercles on the proximal part of the upper surface; it is more slender and curved than the lower finger, which is stocky; both are set with large teeth.

The ambulatories are slender, the carpal and propodal joint are spinose on the upper lateral margin; the distal end of the propodus is produced laterally, reinforcing the dactyl joint; the dactyli are

A



B

A.—*Eriphia squamata* Stimpson. B.—*Eriphia gonagra* Fabr. (Natural size.)

very long, acuminate. Both chelipeds and ambulatories are furnished with many long, dense setae.

SYNONYMY.—*Pilumnus floridanus* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 141, 1870.—MIERS, *"Challenger"* Zoöl., Brachyura, vol. 17, p. 152, pl. 13, fig. 3a to d, 1886.—RATHBUN, Ann. Inst. Jamaica, vol. 1, No. 1, p. 16, 1897; Amer. Nat., vol. 34, p. 139, 1900; U. S. Fish. Comm., vol. 20, part 2, p. 40, 1901; Univ. Iowa Studies Nat. Hist., vol. 7, No. 5, p. 74, 1921; A. MILNE EDWARDS and BOUVIER, E. L., Mem. Mus. Comp. Zoöl., vol. 47, p. 322, 1923.

Subfamily: **Eriphiinae.**

Genus: **ERIPHIA** Latreille.

Eriphia squamata Stimpson.

Plate 47, fig. A.

TYPE: Obtained at Mazatlan, Mexico, and deposited in the "Museum of the Smithsonian Institution"; specimen no longer extant.

DIAGNOSTIC CHARACTERS: There are three American species of *Eriphia, E. gonagra* Fabricius, the West Indian species, which *E. squamata* closely resembles in all the major characters but differs from in having the carapace ornamented anteriorly with coarse squamous, scale-like tubercles which in some places simulate rugae; each tubercle is ringed basally with a fringe of setae. The chelipeds are conspicuously unequal, with the large, scale-like tubercles of the wrist and hand squamous and each tubercle ringed anteriorly or completely with setae. The third species, *E. granulosa* A. Milne Edwards is also a west coast American species and was created by Prof. A. Milne Edwards on a single specimen believed to be from Chile. The principal diagnostic characters given for this species are that the granular tubercles of the gastric of *granulosa* are separate, not arranged in rows, and that the placement of the tubercles on the wrist and hand is distinctive, these tubercles being longitudinally elongated on the carpus. This character is so slight and so variable that at best *E. granulosa* should be regarded as a subspecies of *E. squamata.*

DISTRIBUTION: Known as a reef-dwelling species from Lower California, at Cape St. Lucas, southward to Peru; also one record from Chile.

MATERIAL EXAMINED: One female, Canos Island, Costa Rica.

COLOR: Dark plum purple with a reddish cast, in living specimens.

TECHNICAL DESCRIPTION: Carapace wide anteriorly; the regions distinctly indicated by sulci; the interorbital space is truncate anteriorly,

divided into two major lobes; a deep median longitudinal sulcus extending back onto the gastric region. The anterolateral margin is convex, six acute teeth (more rarely seven or even eight). The first pair of male appendages are well developed rods with a stout blunt tip. The second pair of appendages are nearly as long as the first pair, very slender, with the distal end forming one and one-half to two coils of a spiral.

Synonymy.—*Eriphia squamata* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. VII, p. 56, 1859; S. I. Smith, Rept. Peabody Acad. Sci., p. 90, 1869; A. Milne Edwards, Crust. Rég Mex., p. 339, pl. 56, fig. 3, 1880; Rathbun, Proc. U. S. Nat. Mus., vol. 38, p. 544, pl. 41, fig. 1, 1910; Boone, Zoölogica, N. Y. Zoöl. VIII, No. 4, p. 231, figs. 85A and B; Bull. Amer. Mus. Nat. Hist., vol. LVIII, p. 575, fig. 12 a and b, 1929.

Eriphia gonagra (Fabricius).

Plate 47, fig. B.

Type: Collected in Jamaica and originally deposited in the "Mus. Dom. Banks."

Distribution: West Indian region; littoral.

Material examined: One young female, Port Antonio, Jamaica, 2 fms., February 17, 1926, collected by the *"Ara."*

Color: Body dark wine red, the frontal margin and anterolateral spines yellow; tubercles on the upper part of the chelae violet, yellow on the lower half.

Technical description: The *"Ara"* specimen is no larger than an average size *Pilumnus,* scarcely more than a quarter of an inch wide, yet it bears in miniature all the characters of the species and apparently is the smallest egg-bearing female of the species recorded to date.

Carapace three-fourths as long as wide, frontal region wide, four-lobed, the submedian lobes being much wider than the outer pair. The anterolateral margin is rounded, armed with six acute forward-directed spines. The areolations of the carapace are well defined. There is an irregular row of coarse tubercles on the hepatic region behind the marginal anterolateral spines and running inward behind the orbital region and across the gastric region, where the tubercles are smaller. The postlateral half of the carapace is smooth; the post-

Eriphides hispida (Stimpson), natural size.

lateral margins decidedly convergent. The chelipeds are unequal, the right one usually the larger; both have the palm covered on the upper and outer surfaces, except the extreme lower margin, with rows of coarse, rounded tubercles. The fingers are blackish-brown, lightly grooved; the upper right finger has a large, sub-basal molar; the lower finger has two or three large teeth. The ambulatories are stocky, with sharp nails.

SYNONYMY.—*Cancer gonagra* FABRICIUS, Suppl. Entom. Syst, p. 337, 1798.

Eriphia gonagra H. MILNE EDWARDS, Hist. Nat. Crust., t. I, p. 337, 1798.—Ann. Sci. Nat. 3 serie, t. XVI, 1851, pl. 8, fig. 10.—WHITE. List Crust. Brit. Museum, p. 22, 184.—GIBBES, Proc. Amer. Assoc. Adv. Sci., III, p. 177, 1850.—DANA, U. S. Explor. Exped. Crust., vol. 13, p. 250, 1852.—STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 217, 186.—HELLER, Reise Fregatta Novara, p. 24, 1865.—DESBONNE and SCHRAMM, Crust. Guadeloupe, p. 26, 18.—S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 7, 1869.—KINGSLEY, Proc. Acad. Nat. Sci. Phila. for 1878, p. 397.—A. MILNE EDWARDS, Miss Sci. Méx., t. V, p. 238, pl. 56, figs. 4-4b, 1880.—MIERS, Brachyura, Report Voy. *"Challenger,"* Zoöl., vol. 17, p. 163, 1888.—RANKIN, Ann. N. Y. Acad. Sci., vol. 12, p. 527, 1889.—M. J. RATHBUN, Proc. Wash. Acad. Sci., vol. 2, p. 141, 1900; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 42, 1901.

Genus: **ERIPHIDES** Rathbun.

Eriphides hispida (Stimpson).

Plate 48.

NAME: Purple bristle crab.

DIAGNOSTIC CHARACTERS: Carapace and legs purplish, covered everywhere with coarse, short, stiff, black setae, which usually arise from tubercles.

TYPE: Prof. Stimpson's type, which he states was deposited in the "Museum of the Smithsonian Institution," was found on the west coast of Central America by Capt. J. M. Dow.

DISTRIBUTION: Central America, Panama and the Galapagos Islands.

MATERIAL EXAMINED: One male from Webb Cove, Hood Island, Galapagos, March, 1928; one pair of claws from the same locality, February 5, 1928; one larger, egg-laden female from Indefatigable

Island, Conway Bay, Galapagos Islands, March 11, 1926, collected by the *"Ara,"* William K. Vanderbilt, commanding.

Color: Deep purplish beneath the black setae.

Technical description: Carapace oval, four-fifths as wide as long, interorbital border nearly four-fifths of total width of carapace. Carapace broader through the anterior two-thirds, decidedly narrower posteriorly; rather flattish, with the frontal border somewhat deflexed; aerolations only faintly indicated. Carapace covered with low squamous tubercles, which are larger and more abundant toward the anterior region. Each tubercle is fringed anteriorly with short, stiff setae, and the posterior part of the carapace also has bristly setae between the tubercles; the frontal border is bilobed in the median region, a deep sulcus running back from this median sinus onto the gastric region; the frontal margin is irregularly set with uneven, denticle-like tubercles. Just below these the pterygostomian region is also tuberculate. There are six teeth (including the postorbital tooth) on the anterolateral margin, the first four are large and are bi- or tridentate, the posterior two are smaller and acute. The superior orbital margin is set with denticles; the inferior orbital margin is also denticulate and has a deep hiatus near the external angle. The male abdominal belt is narrow, seven-segmented, with the distal segment triangulate. The female belt is also seven-segmented, oval, narrow, proximally, wider throughout the distal half. The eyestalk is bulbous basally, constricted abruptly below the cornea and thence tapering. The cornea is small and set obliquely at the end. The inner antennae are small and fold transversely within the septum.

The external maxillipeds are squarish and close the buccal cavern tightly except the aperture of the efferent channel, and a very narrow space between the ischia, which latter is covered by a sieve-like setae. The exognath is elongate and bears a tooth-like projection on its inner distal margin and a slender palp which arises from its distal end; the ischium is subrectangular and is traversed on its outer surface by a longitudinal depression and is denticulate on its inner margin; the merus is about one-half as long as the ischium, is trapezoidal, with a slight emargination below the efferent aperture; the palp arises just inside this emargination and the inner distal angle of the merus is angulated beneath the palp. The palp is rather fleshy, three-jointed.

The chelipeds are conspicuously unequal in both sexes, but this inequality is more pronounced in the male. The three basal joints are

small but strong; the merus is compressed and appears to be smaller than the carpus; there is a decided, transverse, subdistal constriction on the upper, outer and inner faces of the merus; the carpus is convex on its outer surface, dilated distally and in the small cheliped is about as large and more swollen than the palm of the propodus, while the carpus of the large cheliped is almost as large as that of the propodus. The upper surface of the merus is finely tuberculate and covered with short, stiff bristles; that of the carpus is coarsely tuberculate, rugose and bristle-clad. The propodus of the great chela is about twice as long as the carpus, the fingers comprising approximately one-half of this length; the palm is quite as high as the carapace and convex; the upper surface is coarsely and rather thickly tuberculate as is also the upper half of the outer surface, the tubercles vanishing along a diagonal line extending from the base of the hinged finger to the lower basal margin; the remaining lower outer surface of the palm is devoid of bristles and is covered with low, flat, scale-like tubercles. On the small chela the entire outer surface of the propodus is covered with bristles and tubercles. The fingers are purplish-black, those of the large chela are widely gaping, except at the tip; the propodal finger is stout and bears one large median tooth; the hinged finger is longer and curved and bears a small sub-basal tooth; the fingers of the small cheliped are spoon-shaped at the tip and meet for the greater part of their inner faces, there being only a small gape basally and no teeth. The female chelipeds are ornamented similar to those of the males. The great chela of the male projects conspicuously beyond the carapace, its width at the wrist being almost equal to one-half of the width of the carapace.

The four pairs of ambulatory legs are similar in structure, stout, strong, with the upper, outer and, in a less degree, the lower surfaces densely covered with short, stiff bristles. The first and second pairs are subequal in length, the third pair is a little shorter, reaching to not quite midway the dactyl of the second leg; the fourth pair of legs are conspicuously shorter, reaching only midway the propodus of the third pair. All four pairs of legs have the meral joint long, wide and flattened with a transverse subdistal constriction and the upper margin finely denticulate; the carpal joint is narrow proximally, wider distally and about as long and thick as the propodal joint; the latter narrows slightly distally and is stout and convex outwardly; the dactyli are about three-fourths as long as the propodi and are very strong, cylindrical, curved, terminating in a strong, horny spine.

SYNONYMY.—*Eriphia hispida* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, p. 218, 1860.

Pseuderiphia hispida A. MILNE EDWARDS, Crust. Rég. Mex., p. 340, pl. 56, fig. 1, 1880.

Eriphides hispida RATHBUN, Proc. U. S. Nat. Mus., vol. 38, p. 586, 1910; Proc. Wash. Acad. Sci., vol. 4, No. 8, p. 282, 1902; Zoölogica, N. Y. Zoöl. Soc., vol. 5, No. 14, p. 158, 1924.—BOONE, Zoölogica, N. Y. Zoöl. Soc., vol. 8, No. 4, p. 236, fig. 87A and 87B, 1927.

Family: CANCRIDAE.

Subfamily: Cancrinae.

Genus: CANCER Linnaeus, 1758.

Cancer borealis Stimpson.

Plate 49.

NAMES: Jonah crab; northern rock crab.

DIAGNOSTIC CHARACTERS: Margins of anterolateral teeth of carapace denticulate.

TYPE: Prof. Stimpson states of his type: "It is a northern species not found south of Cape Cod, although extending to the northward at least as far as Nova Scotia."

DISTRIBUTION: This species has been taken in both shallow and deep water but is more frequently found in great depths. It is rather a rare species and is often confused with the closely related but much more abundant *Cancer amaenus* Herbst. The established records give it a range from Nova Scotia to the West Indies, but it is more often found in the northern fauna than in the southern.

MATERIAL EXAMINED: One very large male dredged in 1100 fathoms, off Miami, Florida, March 3, 1926, with a species of rare deep-sea barnacle, *Poecilasma inequilaterale* Pilsbry, on the crab's back and cheliped.

COLOR: Carapace yellowish beneath, brick-red above. Legs mottled and reticulated brick-red and yellowish, shaded with purplish tints.

HABITS: Professor Sydney I. Smith states that there is a very pronounced difference in habits between *Cancer borealis* and *C. amaenus*, the former usually remaining exposed while the latter conceals itself under rocks.

Cancer borealis Stimpson, two-fifths of natural size.

TECHNICAL DESCRIPTION: Carapace suboval, frontal and anterolateral margins broadly rounded; postlateral margins arcuate, converging with lateral border reflexed as a carina. Frontal border produced slightly beyond the internal orbital teeth, consisting of a longer, depressed, median tooth and a pair of slightly broader, rounded, submedian teeth. The orbit is subcircular, suborbital lobe decidedly produced; two narrow fissures above and two below; the anterolateral border is divided into nine subquadrangular, crenate teeth, the margins of which are minutely denticulate. Surface of carapace finely granulate; mesogastric-cardiac regions moderately delineated by depressions. Under sides of carapace moderately hairy, especially the regions adjacent to the basal half of the legs. The male abdomen is seven-segmented.

The female abdomen consists of seven segments, the sixth and seventh respectively being nearly twice as long as any of the preceding; margins of all segments fringed with short setae. Eyestalks bulbous; cornea smaller, shining black. Antennules robust, basal joint broad, second and third joints cylindrical, subequal; flagellum insignificant. Antennae with basal joint moderately expanded, remaining articles slender, tapering.

Chelipeds subequally enlarged in the male, approximately equal in the female; when relaxed, extending only a trifle beyond the end of the carapace and with the upper margin of the crest of the propodal joint on a plane with the frontal margin. Basis stout, ischium small, almost fused with the long, transversely triangulate merus which is rounded on its outer ventral, and rather sharply carinated its inner and upper longitudinal margins, and also bears a sharp tooth on the latter near the apex, and another tooth at the distal apex. There is a deep groove on each the outer and inner surfaces of the merus paralleling the distal margin and near to it. The carpus is convex on its outer side, finely granulate and produced on its upper distal margin to a tooth-like apex, below which there is a less prominent tooth; the propodus is robust, smooth on its inner surface, convex on the outer surface which bears seven longitudinal carinae; the upper three carinae are set with finely spinous tubercles; the lower three carinae are continued onto the propodal finger, which is stout and armed with seven substantial teeth. The dactylus is stouter basally than the propodal finger and has its inner margin armed with six teeth and its outer margin rounded and finely spinulose. The tips of both fingers

are tipped with slaty black; the cutting edges of the fingers fit closely upon each other.

The ambulatory legs are similar, slender, subequal, compressed, tapering to acuminate dactyli; basal joints somewhat hairy; the upper longitudinal margin of merus in older specimens usually spinulose. The last pair of legs is somewhat smaller than the preceding pairs.

Synonymy.—*Cancer borealis* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 50, 1859.—S. I. Smith, Rept. U. S. Fish. Comm., vol. 1, p. 546, 1871-1872 (issued 1873).—Kingsley, Proc. Acad. Nat. Sci. Phila., p. 317, 1878.—S. I. Smith, Proc. U. S. Nat. Mus., vol. 5, p. 417, 1880 (issued 1881); Bull. Mus. Comp. Zoöl., vol. 10, p. 5, 1882; Proc. U. S. Nat. Mus., vol. 6, p. 15, 1883.—Kingsley, Standard Nat. Hist., vol. 11, p. 62, 1884.—Miers, Rept. "*Challenger*" Zoöl., vol. 17, Brachyura, p. 110, 1886.—S. I. Smith, Rept. U. S. Fish. Comm., vol. 13, p. 629, 1885 (issued 1887).—Stebbing, Hist. of Recent Crust. (Internat. Sci. Ser.), vol. 74, p. 59, 1893.—Faxon, Mem. Mus. Comp. Zoöl., vol. 18, p. 16, 1895.—M. J. Rathbun, Amer. Nat., vol. 34, p. 134. 1900.—Howe, Bull. U. S. Fish. Comm., vol. 9, p. 240, 1899 (issued 1901).—Paulmier, 58th Ann. Rept. N. Y. State Museum, p. 139, text fig., 1904 (issued 1905).—M. J. Rathbun, Occas. Papers Boston Soc. Nat. Hist., vol. 7, p. 10, 1905.—A. G. Mayer, Seashore Life, p. 104, fig. 71, 1906.—Fowler, Rept. N. J. State Museum, p. 426, pl. 133, 1911 (issued 1912).—Sumner, Osburn and Cole, Bull. U. S. Bur. Fish., vol. 31, pt. 2, p. 672, 1911 (issued 1913).—W. P. Hay, Bull. U. S. Bur. Fish., vol. 35, No. 859, p. 434, pl. 35, fig. 2, 1918.

Cancer irroratus (in part) Say, Journ. Acad. Nat. Sci. Phila., vol. 1, pt. 1, p. 59, 1817.

Platycarcinus irroratus De Kay, N. Y. Fauna, Crust., vol. 6, p. 6, 1844, nec. pl. 2, fig. 2.—Gibbes, Proc. Amer. Assoc. Adv. Sci., vol. 3, p. 176, 1850 (issued 1851).

Cancer amaenus Herbst.

Plate 50.

Diagnostic characters: Carapace with nine teeth, which have the margins granulate, not denticulate as in *borealis;* the suture lines between the teeth are continued onto the carapace as short, closed fissures. Color in life yellowish, finely maculated with dark purplish-brown.

Cancer amaenus Herbst, young adult.

TYPE: Herbst's type was without locality, from the collection of Bar. de Block. Say's type was a comparatively young specimen, 2.3 inches wide, without specific locality. He states that "the crabs appear to delight in deep water and are eaten by the black fish and sea bass, being often found entire in their stomachs."

DISTRIBUTION: Known from Nova Scotia to New Jersey as an abundant species and known more sparsely, usually from deep water, as far south as Beaufort, N. C.

MATERIAL EXAMINED: Eight specimens dredged in the upper end of Whitehaven Harbor, Nova Scotia, September, 1926.

COLOR: This species is yellowish on the dorsal surface with numerous small, purplish spots. The underparts are deep cream color.

TECHNICAL DESCRIPTION: Carapace about two-thirds as long as wide, transversely oblong-ovate, with the ninth or lateral tooth sharply angulated; the frontal border is narrowed, trilobed, the median tooth being smaller and slightly in advance of the broad, rounded, submedian pair of teeth which in turn are separated from the narrower, rounded, preorbital tooth by a V-shaped notch. The superior orbital margin bears two closed sinuses. The inferior inner orbital tooth is prominent and well developed. The anterolateral margin is cut into nine teeth, including the postorbital tooth; the suture line between the teeth is continued for a short distance onto the carapace, thus more sharply defining the teeth and giving the posterior three, which are triangulate-tipped, a pentagonal effect. The other teeth are rather bluntly truncated. All nine teeth have the margins granulated, not denticulate as in *C. borealis*. The postlateral margins are convergent with the posterior, and all have a sharply defined, granulose carina. The dorsal surface of the carapace is granulose and pitted, moderately convex, with the regions well defined, the urogastric sulcus deep.

The chelipeds are subequally enlarged in the male, approximately equal in the female; of moderate size, distinctly shorter than the first pair of ambulatories; the merus does not extend beyond the carapace; the carpus is granulated, convex, with several granulose carinae and an acute tooth at the inner lateral angle; the propodus has the palm slightly longer than the carpus and rather thick, with the inner face smooth and the outer face with four or five granulate carinae, the upper most of which is cristate, while two others are continuous onto the finger. The fingers are approximately as long as the propodus; the upper finger is a bit thicker than the lower and has the tip downcurved; there are two or three teeth on the cutting edge.

The ambulatories are long and rather strong; the meral joint of the first and second pairs extend beyond the carapace; the carpal and propodal joints are short, subequal, stout; the dactyl is acuminate with a median longitudinal groove on the lateral faces; there is a fine short fringe of setae on the lateral margins of the meral, carpal, propodal and dactylar joints.

SYNONYMY.—*Cancer amaenus* HERBST, Naturgh., Krabben und Krebse, vol. 3, pt. 1, p. 64, pl. 49, fig. 3, 1799.—S. I. SMITH, Rept. U. S. Fish. Comm. for 1885, p. 630, issued 1886.—WHITEAVES, Catal. Marine Invert. Eastern Canada, publ. in Geol. Surv. of Canada, 1901, p. 261.

Cancer irroratus SAY, Journ. Acad. Nat. Sci. Phila., vol. 1, pt. 1, p. 59, pl. 4, fig. 2, 1817.—S. I. SMITH, Rept. U. S. Fish. Comm., vol. 1, 1871-72, p. 546, issued 1873.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., 1878, p. 546.—S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. V, p. 38, 1879.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., 1879, p. 39.—S. I. SMITH, Proc. U. S. Nat. Mus., vol. VI, p. 15, 1883.—KINGSLEY, Standard Nat. Hist., vol. II, p. 62, 1884.— R. RATHBUN, Rept. Fisheries Industry U. S., vol. 1, p. 766, pl. 260, figs. 1-3, 1884.—MIERS, Rept. Voy. *"Challenger"* Zoöl., vol. 17, p. 110, 1886.—S. I. SMITH, Rept. U. S. Fish. Comm., vol. 13, p. 630, 1885, issued 1887.—LEIDY, Proc. Acad. Nat. Sci. Phila., 1888, p. 333.—HEILPRIN, Ann. Life of Our Seashore, p. 85, pl. 6, fig. 1, 1888.—STEBBING, Hist. Recent Crust. (Int. Sci. Ser. LXXIV), p. 58, 1893.—M. J. RATHBUN, Amer. Nat., vol. 34, p. 134, 1900; Occas. Papers Boston Soc. Nat. Hist., vol. 7, p. 9, 1905.—PAULMIER, 58th Ann. Rept. N. Y. State Mus., vol. 4, 1904, p. 139, fig. issued 1905.—MAYER, Seashore Life, p. 102, fig. 71, 1906.—FOWLER, Rept. New Jersey State Museum, 1911, p. 430, pls. 134 and 135, issued 1912.—BOUVIER, Results Sci. Campagne du Prince Monaco, Fasc. LXII, p. 60.—SUMNER, *et al.*, Bull. U. S. Bur. Fish., vol. 31, pt. 2, p. 671, 1913.—HAY and SHORE, Bull. U. S. Fish. Comm., vol. 35, p. 435, pl. 35, fig. 1, 1918.

Platycarcinus irroratus H. MILNE EDWARDS, vol. 1, p. 414, 1834.—DE KAY, N. Y. Fauna, Crust., vol. 6, p. 7, 1844.—GIBBES, Proc. Acad. Nat. Sci. Phila., 1850, p. 24.—LEIDY, Journ. Acad. Nat. Sci. Phila. (2), vol. 3, p. 149, 1855.—VERRILL, Rept. U. S. Fish. Comm., vol. I, 1871-72, p. 312 and p. 530, pl. 8, fig. 37, issued 1873.

Cancer sayi DEKAY, *l.c.*, p. 7.—LEIDY, *l.c.*, p. 150.

Bathynectes longipes (Risso), natural size.

Family: PORTUNIDAE.

Genus: **BATHYNECTES** Stimpson.

Bathynectes longipes (Risso).

Plate 51.

TYPE: Risso described this species in his report on the Crustacea of Nice, without citing specific locality.

DISTRIBUTION: Mediterranean Sea and adjacent shores of the Hispanic Peninsula, also the Atlantic Ocean in the vicinity of the British Isles. Usually from 80 to 1000 meters depth, more rarely at 40 meters.

MATERIAL EXAMINED: One female dredged in 19 fms., grassy bottom, 10 miles south of Cagliari, Sardinia.

TECHNICAL DESCRIPTION: Carapace about five-sixths as long as wide, with the interorbital region slightly more than one-third of the total width, rounded and with four shallow, rounded teeth, of which the inner or submedian pair are a trifle the smaller; there are two closed sinuses on the superior orbital margin; the postorbital angle bears a strong, rather broad triangulate tooth; the anterolateral margin is short, convex, set with four teeth, of which the first and third are small, acute, subequal to each other, while the second and fourth spines are subequal to each other and of similar shape to the first anterolateral spine but are much longer with a more acute tip; there is a transverse ridge extending across the carapace from tip to tip of the last or lateral spine; the postlateral margin is much longer than the anterolateral, convergent and outlined by a light beading; the posterior margin is short; the female abdominal belt is seven-segmented. The dorsal surface of the carapace is finely setose.

The eyes are large, spherical, black.

The chelipeds are equal, the merus short, trigonal; the carpus nearly as long as the merus, with a pronounced sharp spine at the inner angle; the palm is nearly as high as long, the upper margin cristate; the outer face slightly swollen and with two longitudinal ridges in addition to the carinated lower margin. The lower finger is nearly as long as the palm, thick, with a carina along its lower margin, the cutting edge dentate; the upper finger is stocky but slenderer than the lower, grooved, the tips of both fingers are of a much darker color than the remainder of the claw.

The first, second and third ambulatories are long and slender, the second pair being the longest of the series; all with attenuated, tapering dactyli. The fifth legs are shorter and have the propodus and dactyl wider, subovate, with the margins ciliated.

SYNONYMY.—*Portunus longipes* RISSO, Crust. des Environs de Nice, p. 30, tab. 1, fig. 5, 1816; Hist. Nat. de l'Eur. Merid., vol. 5, p. 4, 1825.—LATREILLE, Encycl. Méth., T. X, p. 192, 1818.—ROUX, Crust. de la Medit. t. IV, fig. 2, 1828.—H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 455, 1834.—BELL, Brit. Stalk-eyed Crust., p. 361, and text fig., 1853.—O. PESTA, Die decapodenfauna der Adria, p. 409, fig. 134 (and comprehensive synonymy), 1918.

Subfamily: **Portuninae.**

Genus: **CALLINECTES** Stimpson.

Callinectes sapidus M. J. Rathbun.

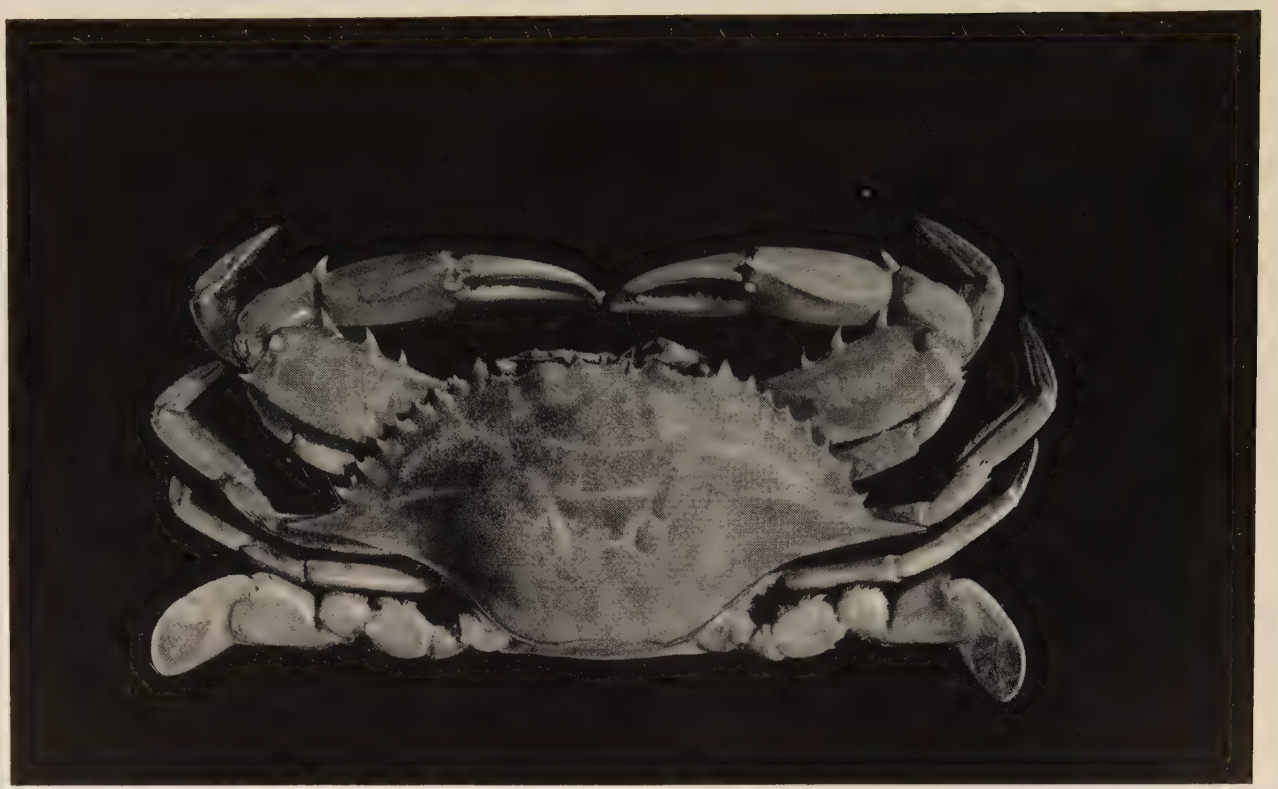
Plate 52.

TYPE: Say's type was collected in "Our markets from all the bays and inlets of the seacoast," and was deposited in the Academy of the Philadelphia Academy of Natural Sciences.

DISTRIBUTION: Abundant on the Atlantic Coast of the United States from Cape Cod, southward through the West Indies to northern Brazil.

MATERIAL EXAMINED: One specimen from Miami, Florida, 1923.

TECHNICAL DESCRIPTION: Carapace elongate oval, the lateral tooth sharp, prominent, distinctly up-curved and slightly forward-directed. There are four frontal teeth in addition to the postorbital teeth; the inner, or submedian pair of teeth are decidedly the weaker and are separated from each other by a shallow sulcus; the second pair of frontal teeth are separated from the inner pair by a wide, shallow, U-shaped sinus and are triangulate, the apex being slightly in advance of that of the more blunt, preorbital tooth. The inferior orbital tooth is triangulate and is more prominent in dorsal view than the superior orbital tooth. The superior orbital margin is long and bears two nearly closed sinuses; the postorbital tooth is strong, triangulate; the anterolateral margin bears eight teeth in addition to the preorbital tooth; the third to sixth teeth, inclusive, are broad, triangulate; the second tooth is similar to, but narrower than, the third tooth; the



Callinectes sapidus Rathbun, two-thirds of natural size.

seventh and eighth teeth are similar to those preceding but have the tips more acuminate; that of the eighth tooth directed slightly forward; the ninth or lateral tooth is strong, acuminate, directed slightly upward and forward and outward. There is a fringe of setae beneath the teeth of the anterolateral margin. The dorsal surface is moderately convex, with the regions clearly delineated, the urogastric and cervical grooves being the most prominent. There is a fine carina formed of granulations extending across the carapace and out onto the lateral spine; there is a similar, shorter carina anterior to this on the gastric region. The postlateral and posterior margins are lightly carinated. The male abdominal belt is narrowly T-shaped, five-segmented, the first segment very short, obscure; the next segment short but wide, filling the space between the fifth pair of legs and with a sharp, median, transverse carina; the third and fourth segments are completely fused, a sharp transverse carina on the third segment; the fifth and sixth segments are narrow, fused, but retain a suture line indicating the fusion; the seventh segment is triangulate with the tip rounded. The sternal plaston is wide, flattish, with the suture lines sharply defined.

The external maxillipeds have the ischium subrectangular, the distal margin slightly sinuate, the inner lateral margin fringed with short setae; there is a decided longitudinal sulcus on the outer face of the ischium; the merus is three-fourths as long as the ischium and has the outer distal angle produced and rounded; the inner dostal angle is obliquely excavate for the reception of the palp, which is composed of three joints of subequal length but of gradually decreasing width.

The eyestalk is short, constricted below the cornea, which is terminal, subspherical and directed upward.

The antennulae fold transversely in the septum, which is divided by a strong median tooth; the basal article is enlarged, the free article slender.

The antennae have the basal article anchylosed, produced into a tooth-like cusp in the orbital sinus; the second and third articles are slender, successively smaller; the flagellum is very slender and is equal to one and one-half times the long diameter of the orbit.

The chelipeds are subequal; the merus is three-sided, with three acute spines on the anterior margin; the carpus is slightly elongate, convex, with a subdistal tooth on the outer lateral margin from which an oblique carina runs back along the lower margin; above this there is a second carina, and on the upper face there are two short granular

ridges. The propodus is chunky, the palm has the upper surface about as wide as the outer face from which it is defined by a prominent longitudinal ridge at the proximal end of which there is an acute spine; a similar carina defines the inner lateral margin of the palm and terminates distally in an acute tooth; there is a lighter carina approximately midway between these two; all three carinae are continuous on the finger, the median one being the most prominent; the outer face of the palm has a very strong median carina, also one just above the lower margin, which is continuous onto the finger. There is one prominent ridge on the inner face of the palm. The fingers are about as long as the palm, approximately subequal, slightly gaping, with the tips decidedly curved; the cutting edge is furnished with large, triangulate teeth between each of which are two smaller triangulate teeth.

The ambulatories are long, similar, the carpus, propodus and dactyl have a dense brush of short setae on the anterior lateral margin; there is a short fringe on the posterior lateral margin of the dactyl. Here are two longitudinal grooves on each face of the dactyl and one on each face of the propodus.

The natatory leg is strong, the four promixal joints stocky, the propodus and dactyl laminate, suboval.

Color: In life this crab is bluish-green or grayish-green, with the chelipeds and ambulatories vivid blue, etched at the joints, tips and spines with carmine. There are also touches of carmine on the spines of the carapace.

Habits: A very excellent account of the habits and life history of this crab are given by Hay and Shore in their report on the "Decapod Crustaceans of the Beaufort, N. C., Region."

Synonymy.—*Lupa hastata* Say, Journ. Acad. Nat. Sci. Phila., vol. 1, p. 65, p. 443, 1817.

Lupa diacantha DeKay, Nat. Hist. N. Y. Zoöl., part 6, Crust., p. 10, pl. 3, fig. 3, 1844.—Leidy, Journ. Acad. Nat. Sci. Phila. (2), III, p. 149, 1855.

Callinectes diacanthus A. Milne Edwards, Miss. Sci. Méx. Crust., vol. 5, p. 223, pl. 41, 1878.

Callinectes hastatus Ordway, Boston Journ. Nat. Hist., vol. 7, p. 568, 1863.—Verrill, Rept. U. S. Fish. Comm., vol. 1, 1871-72 (1873), p. 367, p. 468, p. 516.—S. I. Smith, *idem*, p. 548.—Uhler, Field and Forest, vol. 2, p. 73-76, 1876.—Kingsley, Proc. Acad. Nat.

Callinectes larvatus (Ordway), natural size.

Sci. Phila., 1878, p. 320.—A. Milne Edwards, *op. cit.*, vol. 5, p. 224, 1878.—Conn, Johns Hopkins Univ. Circ., Nov., 1883, p. 5.—R. Rathbun, Rept. Fish. Ind. U. S., vol. 1, p. 775, 1884.—Leidy, Proc. Acad. Nat. Sci. Phila., p. 333, 1888.—Heilprin, Animal Life of Our Seashore, p. 85, 1888.—H. M. Smith, Bull. U. S. Fish. Comm., vol. 9, p. 104, 1889 (1891).—Paulmier, 58th Ann. Rept. N. Y. State Mus., 1904, vol. 4, p. 142, fig. 11, issued 1905.

Neptunus hastatus Uhler, Chesapeake Zoöl. Labr., Johns Hopkins Univ., vol. 1, 1878, p. 25.—Kingsley, Standard Nat. Hist., vol. 2, p. 63, 1884.—Paulmier, 55th Ann. Rept. N. Y. State Mus., 1901, p. 129.

Callinectes sapidus M. J. Rathbun, Proc. U. S. Nat. Mus., vol. 18, p. 352, 1895, pl. 12, pl. 24, fig. 1, pl. 25, fig. 1, pl. 26, fig. 1, pl. 27, fig. 1; Amer. Nat., vol. 34, p. 140, fig. 3, 1900; Occas. Papers Boston Soc. Nat. Hist., vol. 7, p. 9, 1905.—Mayer, Seashore Life, p. 99, fig. 67, 1906.—Fowler, Proc. Acad. Nat., 1911, p. 3; *op. cit.* for 1913, p. 64; Rept. N. J. State Museum, Crust., vol. for 1911 (1912), p. 416, pls. 128, 129, 130.—Verrill, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 370, figs. 22a, 23a, 24, pl. 17, fig. 2, 1908.—Sumner, *et al.*, Bull. U. S. Bur. Fish., vol. 31, p. 432, 1911.—Hay and Shore, Bull. U. S. Bur. Fish., vol. 35, p. 432, 1918.

Callinectes larvatus Ordway.

Plate 53.

Type: Ordway's type material came from Key West, Tortugas, Fla.; Bahamas and Haiti.

Distribution: Known from the Florida Keys and Bahamas, southward to Brazil. The species has also been reported from west Africa by Miss Rathbun; however, other writers consider the African species to be *C. marginatus,* a species distinct from the closely related *C. larvatus* Ordway. Until I have more definite evidence of the identity of these two species than has been presented to date, I believe it advisable to keep them distinct.

Material examined: One specimen from Miami, Fla., collected by the "Ara."

Technical description: This species is closely allied to the West Indian *C. ornatus* Ordway, from which it may be distinguished by the fact that the median pair of frontal teeth of *C. larvatus* are more

prominent, and the anterolateral teeth are wider, obtuse and with the margins more arcuate than those of *ornatus*. The carapace is moderately convex; the areolations well defined; granulations coarse; the frontal teeth four, the inner pair small; the outer pair well developed; there are eight anterolateral teeth well separated by deep sinuses; the first four teeth are obtuse, the remainder more acute; the second to fifth teeth, inclusive, each have their posterolateral margin convex. The lateral spine is acute, 2.5 times as long as the preceding spine; there is a finely beaded carina running inward from this tooth onto the branchial region.

The chelipeds have the anterolateral margins of the merus armed with three or four acute spines; occasionally one, blunted at the posterolateral distal angle of the merus; the propodus has one prominent acute tooth proximally at the base of the outer costa of the upper face and a small tooth at the distal end of the inner costa of the upper surface above the base of the dactyl. All the costae of the propodus are prominent, composed of medium-sized granules.

The second, third and fourth legs are slender, typically *Callinectes;* the fifth legs with thickened ischium, merus and carpus; the propodus and dactyl laminate.

SYNONYMY.—*Callinectes larvatus* ORDWAY, Journ. Boston Soc. Nat. Hist., VII, p. 573, 1863.—S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 9, 1869.—RATHBUN, Proc. U. S. Nat. Mus., vol. 18, p. 358, pl. 17, pl. 24, fig. 5, pl. 25, fig. 4, pl. 26, fig. 4, pl. 27, fig. 4, 1895.—RANKIN, Ann. N. Y. Acad. Sci., vol. XI, p. 232, 1898.

Callinectes marginatus RATHBUN, Proc. Biol. Soc. Wash., vol. XI, p. 149, 1897; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 48, 1901.

Callinectes marginatus var. *larvatus* VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 368, text fig. 22b, pl. 18, fig. 1, 1908.

Genus: **PORTUNUS** Weber.

Subgenus: **Portunus** Rathbun.

Portunus (Portunus) sulcatus A. Milne Edwards.

Plate 54.

NAME: Red-finny crab.

DIAGNOSTIC CHARACTERS: Carapace convex, with anterolateral second, fourth, sixth and eighth teeth smaller than those alternating; lateral

Portunus (*Portunus*) *sulcatus* (A. Milne Edwards), natural size.

tooth scarcely longer than the seventh tooth. Propodus with four prominent beaded carinae, the carina immediately below the upper margin terminating in a subdistal spine; the upper margin is also carinate with a large distal and a subdistal spine.

TYPE: "From the coasts of Guadeloupe"; also a specimen taken by the "*Hassler*" Expedition in Lat. S. 11° 27′, in 17 fms.; deposited in the Paris Museum.

DISTRIBUTION: Pelagic from the coasts of Georgia, U. S. A., southward throughout the West Indies to Brazil. This crab is a very rapid swimmer and is often found far out at sea.

MATERIAL EXAMINED: One male with left cheliped in process of regeneration, taken at electric light, Miami, Florida, by the "*Ara*," William K. Vanderbilt, commanding.

COLOR: Mr. Vanderbilt's field-notes state that the legs of this crab are margined with crimson.

TECHNICAL DESCRIPTION: Carapace oval, very convex from the center down to the edges, a finely beaded, curved carina extending from the gastro-cardiac region to the lateral spine; a rather deep sulcus on either side of the gastro-cardiac region; a shorter, similar carina on the metagastric region; dorsal surface of carapace finely pubescent. Frontal teeth six, besides the preorbital, the submedian pair more bluntly rounded than the adjacent triangulate pair and with the projection of the epistome visible between them; the sinus separating the second and third, or outer, pairs of teeth is a wide, deep U-shape; the third pair of teeth are more acuminate than the second pair. The preorbital tooth is triangulate, with a median rib beaded, the tip directed outward. The infraorbital angle is beaded, triangulate, visible dorsally; there is also a tooth on the basal peduncular joint of the antennae, which is visible dorsally. The superior orbital margin has two nearly closed sinuses; the inferior margin has one V-like sinus, with an acute tooth at its outer side, the remainder of the margin crenulated. The postorbital tooth is large, acute, triangulate, and is followed by a much smaller acuminate tooth; the third, fifth and seventh teeth are large like the first tooth; the fourth, sixth and eighth teeth are small like the second tooth; the seventh or lateral tooth is slightly larger than any of the others and is outward and forward curved. The postlateral margins are lightly carinated and the posterior margin is rather heavily carinated. The male belt is triangular,

five-segmented, the third, fourth and fifth segments being completely fused, but with a carina marking the union of the third and fourth segments; the second and third segments each have a prominent median transverse carina.

The antennulae have the basal segment narrow and wide, the free articles, slender, cylindrical, folding transversely.

The antennae have the basal peduncular joint rounded into knob distally which is appressed to the orbit and armed subdistally with a tooth, the free articles are small; the flagellum long, extending to the tip of the seventh lateral tooth.

The external maxillipeds have the ischium rectangular, the merus squarish, three-fifths as long as the ischium and slightly excavate for the reception of the palp.

The chelipeds are highly ornamented, the merus having five, strong, acute teeth on the inner lateral margin; the carpus with a prominent tooth at the inner angle, a minute one at the outer angle, three interrupted carinae on the outer surface, the median of which bears a distal and a subdistal tooth; there is also a prominent tooth proximally on the propodus, at the median tip of the carpus; the propodus is robust, slightly longer than the fingers and bears on its outer face four beautiful beaded, heavy carinae, the lowest of which is continuous to the tip of the lower finger; the fourth carina, just below the upper margin terminates in an acute subdistal tooth.

The upper margin is beaded and bears two acute teeth, one distal and one midway its length; the fingers are slender, grooved and irregularly dentate; the tips are a darker color than the rest of the fingers.

The ambulatories are slender, with long, grooved dactyli.

The natatory leg has the merus elongate, three carinae on the upper surface, the outer of which forms the posterior lateral margin and terminates in a subdistal tooth; the propodus is as large as the dactyl and subovate; the dactyl is oval.

Synonymy.—*Neptunus sulcatus* A. Milne Edwards. Miss. Sci. au Méx. et dans l'Amerique Centrale, t. V, p. 26, pl. 39, fig. 3, 1881. —A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, p. 311, 1923.

Portunus (Portunus) sulcatus M. J. Rathbun, Bull. U. S. Fish. Comm., vol. 20, part 2, p. 45, 1901; State Univ. Iowa Studies Nat. Hist., vol. 9, No. 5, p. 67, 1921.

A.—*Portunus* (*Portunus*) *vocans* (A. Milne Edwards), natural size. B.—*Portunus* (*Portunus*) *sayi* (Gibbes), slightly enlarged.

Portunus (Portunus) vocans (A. Milne Edwards).

Plate 55, fig. A.

DIAGNOSTIC CHARACTERS: An acute spine at each end of the posterior margin of the carapace. Dorsal surface of the carapace is roughened; four tubercles form an arc on the mesogastric region; there is a transverse, granulate carina extending across the carapace from tip to tip of the lateral spines; other rugosities are present. Carpus of the chelipeds with three denticulate ridges and an acute spine at each the inner and outer angles; propodus well developed, five denticulate ridges, the uppermost terminating in a distal spine; the median one with a large basal spine.

TYPE: Prof. Milne Edwards' type was taken at the Cape Verde Islands by M. de Cessac and is deposited in the Paris Museum.

DISTRIBUTION: Very rare. Cape Verde Islands; Carenge Bay, Haiti.

MATERIAL EXAMINED: One ovigerous female dredged in Carenge Bay, Le Mole, Haiti, February 4, 1924.

TECHNICAL DESCRIPTION: Carapace elongate oval, 18 mm. long, 33 mm. wide from tip to tip of lateral spine, interorbital space 7.5 mm. wide; frontal teeth four, broadly rounded, well separated, the inner pair more semicircular than the outer, the preorbital tooth small, subacute, well separated from the others; the superior orbital margin crenulate, with two linear sinuses; the postorbital angle is acute and immediately beneath it there is another small acute tooth; below this and beneath the second marginal tooth is a row of three oval tubercles. The inferior orbital margin has two wide V-shaped sinuses, one below the orbital tooth and one just inside the inferior inner orbital tooth, which is prominent, rounded; the opposite angle of this sinus forms a blunt tooth. The anterolateral margin has eight teeth in addition to the preorbital tooth; seven of these are approximately equal, decreasing very slightly in width and increasingly acuminate from the first to seventh, with the tips directed forward; the ninth or lateral tooth is but a trifle longer than the eighth and is very acuminate, upward and slightly forward directed. The postlateral margins are concave; the posterior margin is relatively straight, lightly carinate, terminating in an acute upcurved spine at each end. Four rounded tubercles form an arc on the mesogastric region. There is a continuous tuberculate carina extending across the carapace from tip to tip. The cervical and urogastric grooves are very prominent. There is a flattish tubercle

at either end of the urogastric groove and posterior to this on the cardiac region there is a short, broken, transverse carina on the median cardiac region, and opposite each end of it on the summit of the branchial region is a linear tubercle. The female abdominal belt is oval, seven segmented and has transverse carinae on each the second and third segments.

The chelipeds are equal, the merus with three acute spines on the anterolateral margin and one acute spine at the distal end of the posterior margin; the carpus is very sharp and has four longitudinal carinae, one extending onto the tip of the acute spine at the outer distal angle; there is also an acute spine at the inner carpal angle; the propodus is robust, with the upper surface wider than in most American *Portunids;* there are five denticulate longitudinal carinae on the palm; the uppermost of these is curved and terminates distally in an acute up- and forward-pointing spine. The carina immediately below the uppermost one is composed of very coarse, denticulate granules; the median carina has a large, acute tooth at its base; the fourth and fifth carinae are less denticulate and are continuous on the lower finger to its tips. The upper finger has three carinae on its outer face, the uppermost of which is denticulate proximally. The right hinged finger of the female has a very large basal tooth; the other teeth of both fingers are smaller, triangulate.

The ambulatories are exceedingly slender, the carpus, propodus and especially the dactyl grooved longitudinally. The dactyli are slender, acuminate, about as long as the propodus.

The natatory legs of the present specimen are missing. Those of the type are said to be of the typical *Portunid* form.

The eye is reniform, shining black, composed of many facets and filling the orbital cavity.

The antennules have the basal article greatly enlarged; the second and third articles are very slender and fold transversely within the fossett.

The antennae have the basal article situated in the orbital sinus, stocky, without a node at the inferior distal angle; the second and third articles are successively smaller; the flagellum is about twice as long as the long diameter of the orbit.

The external maxillipeds are typically those of *Portunus;* the ischium is rectangular, with a longitudinal groove; the merus has the external distal angle somewhat flaring, the distal margin truncate and the inner angle well excavate for the reception of the palp.

Portunus (*Portunus*) *xantusi* (Stimpson). A, female; B, male; natural size.

SYNONYMY.—*Neptunus vocans* A. MILNE EDWARDS, Bull. Philom. Soc., series 7, tome II, p. 225, June, 1878.—MIERS, Rept. *"Challenger"* Zoöl., Brachyura, vol. 17, p. 174, 1886.—A. MILNE EDWARDS and BOUVIER, Exped. Sci. du Travailleur et du Talisman, Crust. Décap., p. 68, pl. 14, figs. 6-9, 1900.

Portunus (Portunus) xantusi (Stimpson).

Plate 56, figs. A and B.

NAME: This species was named in honor of the collector, Mr. J. Xantus.

DIAGNOSTIC CHARACTERS: This species is readily distinguished from all other West American *Portunids* by the presence of a prominent rugose ridge, paralleled anteriorly by a deep sulcus, which curve out toward the base of the strong lateral tooth.

TYPE: Prof. Stimpson states that the species was "very common on the beaches of Cape St. Lucas" (L. C.). His type material was originally in the collections of the U. S. National Museum, but is no longer extant.

MATERIAL EXAMINED: One young male and one larger male from the Perlas Islands, March, 1928; one adult male and a female from Punta Arenas, Costa Rica, February, 1928, taken by the *"Ara,"* William K. Vanderbilt, commanding.

DISTRIBUTION: Pelagic from Santa Monica Bay, California to Chile.

TECHNICAL DESCRIPTION: Carapace oval, 21.5 mm. long, 35 mm. wide from tip to tip of lateral spines; interorbital space 8 mm. wide. There are four frontal teeth in addition to the bifid preorbital teeth; these four are triangulate, equally prominent, separated by sinuses equal in size to the teeth; in older specimens the outer pair are slightly wider than the inner pair. There are nine anterolateral teeth, including the postorbital, which is subacute and a trifle broader than the seven lateral teeth, which are acute, the tips pointing forward, the posterior lateral margin convex; the ninth or postlateral tooth is about twice as long as the preceding tooth and is directed straight outward. The postlateral margins are concave and are about as long as the anterolateral margins; the posterior margin is about as wide as the orbital space and is relatively straight. The dorsal surface of the carapace is pubescent and granulose; there is a prominent rugose

ridge, paralleled anteriorly by a deep sulcus, both of which curve from the gastro-cardiac region out toward the base of the strong lateral tooth. There are also two transverse tuberculated ridges on the gastric region, the hinder one being much the shorter. The superior orbital margin has two closed linear sinuses; there is one small V-shaped sinus on the other half of the inferior orbital margin, which, like the superior margin, is granulose and fringed with setae. The infra-orbital angle is bluntly triangulate and is visible dorsally. The outer distal angle of the peduncular joint of the antennae forms a rounded, tooth-like node, situated in the orbital sinus.

The chelipeds of the old males are much longer and stronger than those of the female; the merus has the upper surface pubescent, and with a series of transverse, granulose rugae; the anterior margin is armed with four, occasionally five, acute teeth; the carpus has three longitudinal ridges on the upper surface, a very prominent acute tooth at the inner angle, a minute tooth at the outer angle and another tooth occurs at the outer propodal face, proximally and closely adjacent to the median carpal angle; the propodus has four longitudinal ridges on the outer face and a fifth ridge on the upper margin which terminates subdistally in an acute tooth; the fingers are slender and have the inner and outer faces grooved, the tips brown, curved, crossing.

The ambulatory legs are slender, with the meral, carpal and propodal joints longitudinally ridges and with lines of pubescence between the ridges and fringing the anterior lateral margin. The dactyli are long, grooved, acuminate.

The natatory legs are stocky, the dactyl ovate-laminate.

The external maxillipeds have the ischium subrectangular with a slightly emarginate distal margin and an oblique longitudinal groove on the outer face; the merus is five-sixths as long as the ischium but slenderer with the distal margin moderately rounded, the inner lateral angle slightly excavate for the reception of the palp.

SYNONYMY.—*Achelous xantusi* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 222, 1860 (1862).

Neptunus xantusii A. MILNE EDWARDS, Arch. Mus. Nat. Hist., X, p. 429, 1860; Crust. Reg. Méx., p. 213, pl. 38, fig. 1, pl. 39, fig. 3, 1879.

Portunus xantusi Holmes, Occas. Papers Calif. Acad. Sci., vol. 7, p. 71, 1900.—Rathbun, American Naturalist, vol. 34, p. 140, 1900.—Crust. Harriman Alaska Exped., vol. 10, p. 179, 1904; Proc. U. S. Nat. Mus., vol. 38, p. 577, 1910.—Weymouth, Stanford Univ., Series No. 4, vol. 49, pl. 12, fig. 35, 1910.—Schmitt, Univ. Calif. Pub. Zoöl., vol. 23, p. 237, fig. 141, 1921.—Rathbun, Bull. Amer. Mus. Nat. Hist., vol. 48, p. 620, 1923.

Portunus (Portunus) sayi (Gibbes).

Plate 55, fig. B.

Names: *Sargassum* crab. This species was named in honor of Thomas Say, an American carcinologist, who first described the occurrence of this species in American waters, mistaking it for the European form, *L. pelagica.*

Diagnostic characters: This is a very small species frequently found clinging in *Sargassum* weed, the yellow and cream color pattern of which the crab imitates.

Type: Say simply records the species as "found in the Gulf Stream." His type was deposited in the Philadelphia Academy of Natural Sciences. Mr. Gibbes' material was taken at Charleston, South Carolina, and is also deposited in this museum.

Distribution: Found northward in the Gulf Stream as far as Wood's Hole, Mass.; abundant from Cape Hatteras, N. C., southward throughout the West Indies.

Material examined: One male taken at Pilon, Cuba, February, 1928. One specimen, in *Sargassum,* 10 miles south of Swan Island, Caribbean Sea, March 23, 1926, by the *"Ara,"* William K. Vanderbilt, commanding.

Color: The upper surface of the crab's body and legs is irregularly spotted with yellow and cream in imitation of the coloration of the *Sargassum.*

Technical description: Carapace elongate oval, relatively smooth, aerolations but weakly defined. The frontal margin has three weak, shallow, broadly rounded teeth in addition to the preorbital teeth which are weak, rounded and only about half as wide as the adjacent pair of teeth. The inferior, inner orbital tooth is a broad, blunt triangle, moderately prominent in a dorsal view. There are nine teeth

on the anterolateral margin, including the preorbital tooth; the first four teeth are obtuse, triangulate, the next four are more acute, the last two being especially sharp-tipped; the ninth or lateral tooth is four or five times as long as the eighth tooth, very acuminate, pointing direct outwards. The anterolateral margin is fringed with setae, which show between the teeth. The postlateral margins are concave, the posterior margin straight, with a light carina. The male abdominal belt is five-segmented, triangulate, with the second segment much the widest, sharply carinate transversely and forming an acute tip at each distal end. The female belt is characteristically oval. An average size female will carry 2000 to 3000 eggs at one time.

The chelipeds are of moderate length, the extended merus reaching out about as far as midway the lateral spine; there are three, occasionally four, acute, curved spines on the anterolateral margin of the merus; one sharp spine at the distal angle of the posterior margin; the carpus has a spine at the outer angle but none at the inner angle; the propodus has five longitudinal carinae; the fingers are grooved, the cutting edges dentate, the tops curved.

The ambulatories are very slender, the dactyli very acuminate, longer than the related propodi; the inferior lateral margin is fringed with long setae. In life, these legs fasten hook-like around the *Sargassum* weed.

The natatory legs are remarkably strong and well developed; the propodus and dactyl are both broad, oval.

The external maxillipeds have the typical *Portunus* formation, the ischium rectangular, three-fourths as wide as long with a median groove; the merus with the distal margin rounded, excavate for the reception of the palp.

The antennulae fold transversely beneath the frontal margin.

The antennae are situated in the orbital sinus; the basal article has a node at its inferior distal angle; the remaining articles are successively smaller.

The eye is large, reniform, shining black.

Synonymy.—*Portunus pelagicus* Bosc, Hist. Nat. des Crust., I, p. 220, pl. 5, fig. 3 (part), 1802.

Lupa pelagica Say, Journ. Acad. Nat. Sci. Phila., vol. 1, p. 97.—De-Kay, Zoöl. N. Y. Crust., vol. VI, p. 11, pl. 6, fig. 8, 1844.

Lupa sayi L. R. Gibbes, Proc. Amer. Assoc. Adv. Sci., p. 178, 1850.—Dana, U. S. Explor. Exped., vol. 13, pt. 1, p. 273, pl. —, 1852.—Stimpson, Proc. Phila. Acad. Nat. Sci., 1858, p. 38.

Portunus (Portunus) corrugatus (Pennant), natural size.

Neptunus sayi Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 92, 1860.—A. Milne Edwards, Arch. Mus. Hist. Nat., vol. 10, p. 317, pl. 29, figs. 2*a*, 2*b*, 1861.—Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 147, 1870-71.—Smith and Harger, Trans. Conn. Acad. Arts and Sci., vol. 3, p. 26, 1874.—Kingsley, Proc. Acad. Nat. Sci. Phila., p. 319, 1878; *op cit.*, p. 398, 1879.—A. Milne Edwards, Miss. Sci. Méx., vol. V, p. 210, 1879.—S. I. Smith, Trans. Conn. Acad. Arts and Sci., vol. 5, p. 121, 1879.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 48, p. 311, 1923.

Portunus sayi Rathbun, Bull. Labr. Nat. Hist. State Univ. Iowa, p. 276, 1898; Ann. Inst. Jamaica, vol. 1, No. 1, p. 22, 1897; Amer. Nat., vol. 34, p. 140, 1900.

Portunus (Portunus) corrugatus (Pennant).

Plate 57.

Diagnostic characters: Carapace suboval, upper surface entirely covered by transverse beaded rugae, giving it a wrinkled appearance; anterolateral margin five-toothed.

Type: Pennant first described this species from the shores of the Skie, opposite to Loch Jurn, England.

Color: In life this species is yellowish-brown, with streaks of red on the back.

Habits: It is predatory and a strong swimmer.

Distribution: Known from the coasts of Ireland, England, southward on the European coast to the Mediterranean Sea; also at the Azores. Pelagic. Also in Japanese waters, the Australian seas and a variety from the Red Sea.

Material examined: One male, dredged in 19 fms., grassy bottom, 10 miles south of Cagliari, Sardinia, July 23, 1927, by the *"Ara,"* William K. Vanderbilt, commanding.

Technical description: Carapace oval, nearly subcircular, 32 mm. long, 36 mm. maximum width, upper surface moderately convex, entirely covered by broken, transverse rugae which are microscopically granulate and are margined on the ribs by regularly placed setae. Behind the frontal border are two especially prominent, short, arcuate rugae, one behind the other; there are also three especially promiment rugae on the mesogastric region, two crossing the mesocardiac

region and one or two especially prominent rugae crossing the anterior intestinal region. The frontal margin is trilobate, the median lobe being the wider, its margin regularly convex and evenly dentate; the submedian teeth are not quite as protruding as the median and have the inner side shorter than the outer, which is curved out continuous with the almost right-angled preorbital angle, and regularly dentate. The superior orbital margin is crenulate or dentate and has two straight sinuses. There is one sinus on the inferior orbital margin, and it is also dentate; the infraorbital angle is right-angled, prominent but wide apart from the superior margin. The anterolateral margin is rounded, cut into five sharp, forward-directed teeth, including the preorbital tooth. Of these, the first and second teeth are subequal, slightly smaller than the third and fourth teeth, which are also subequal and have the postlateral side more convex; the fifth tooth is the smallest of the series but is well developed, acute and directed more sharply upward. The postlateral margins are convergent, excavate; the posterior margin is narrow, straight. The male abdominal belt is five-segmented; the first and second segments are narrow, with a transverse median ridge; the third, fourth and fifth segments are fused, with two transverse carinae; the sixth segment is narrowed distally; the seventh segment is triangulate. The sternal plastron is hirsute and has many transverse rugae. The pterygostomian region is hirsute and has many rugae.

The external maxillipeds are finely setose on the outer surface and have the exognath long, slender; the ischium subrectangular, with a deep, submedian longitudinal groove on the outer face; the merus is squarish, with the inner lateral angle broadly truncated for the reception of the palp.

The antennulae have the basal joint large, the free joints very slender, folding transversely.

The antennae has the basal article produced on its outer distal side into a flaring rounded lobe that occupies the wide infraorbital fissure; the second and third articles are successively slenderer; the flagellum consists of about 38 articles.

The eyestalk is short, densely setose; the cornea is shining black, spherical, composed of many fine facets.

The chelipeds are slightly unequal in the male, short; the merus three-sided, its under face especially marked by diagonally transverse rugae; the carpus is convex, dorsally produced on the inner lateral margin to an acute, broad, triangulate tooth; the upper surface covered

with broken rugae; the palm is short and thick, with an acute, subdistal tooth on the upper margin; the outer surface is covered by transverse rugae, and has also two longitudinal carinae, in addition to those on the upper and lower margins, making four carinae in all. The fingers are almost as long as the palm, the upper one with three longitudinal carinae, the lower finger with two carinae. The small claw has the fingers regularly dentate, close-fitting; the large one has an elliptical gape and a large, sub-basal tooth on the upper finger. The tips, or nearly half the fingers, are of a much darker color.

The first, second and third ambulatories are slender, subequal, finely hirsute; the propodi are short and are ornamented with two longitudinal carinae on each lateral face in addition to the carinae of the anterior and posterior lateral margins; the dactyli are approximately one and one-half times as long as the related propodi, and are very slender, tapering, with two longitudinal carinae on each lateral face, the tip acute; the lateral edges of the dactyli are fringed with setae.

SYNONYMY.—*Cancer corrugatus* PENNANT, Brit. Zoöl., vol. 4, p. 5, pl. 5, fig. 9, 1777.

Portunus corrugatus LEACH, Edinb. Encycl. Lond., vol. 7, p. 390, 1814; Trans. Linn. Soc. Lond., vol. XI, p. 315, 1815; Malac. Podopth. Brit., pl. 7, figs. 1 and 2, 1815.—H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 443, 1834.—DEHAAN, Crust. in VON SIEBOLD, Fauna Japonica, p. 40, 1835.—BELL, Brit. Stalkeyed Crust., p. 94, 1853.—A. MILNE EDWARDS, Archiv. Must. Hist. Nat., vol. X, p. 401, pl. 26, fig. 3, 1861.—HELLER, Crust. des Sudl. Europa, p. 86, 1863.—MIERS, Proc. Zoöl. Soc. Lond., p. 33, 1879.—Voy. *"Challenger"* Rept. Zoöl., vol. 17, p. 200, 1886.—J. BONNIER, Catal. des Crust. de Concarneau, p. 26, 1887.—A. E. ORTMANN, Zoöl. Jahrb. Syst., vol. 7, p. 70, 1893.—A. MILNE EDWARDS and BOUVIER, Exped. Sci. du Travailleur et du Talisman, Crust. Décap., p. 64, 1900.—O. PESTA, Die Decapoden fauna der Adria, p. 405, fig. 132, 1918 (and extensive synonymy).

Portunus carcinoides KINAHAN, Dubl. N. H. Review Proc. of Soc., vol. IV, p. 66, pl. IX, fig. 3, 1857.

Portunus strigilis STIMPSON, Proc. Acad. Nat. Sci. Phila., p. 38, 1858. A. MILNE EDWARDS, *tom. cit.*, p. 402, 1861.

Portunus subcorrugatus A. MILNE EDWARDS, Archiv. Mus. Hist. Nat., *tom. cit.*, p. 402, pl. 36, fig. 2, 1861, variety.

Portunus holsatus Fabricius.

Plate 58, fig. A.

Diagnostic characters: Carapace nearly subcircular; frontal teeth three, the median slightly the longest; anterolateral margin with five teeth, including the postorbital; dorsal surface with weak areolations, smooth, finely pubescent.

Type: Fabricius stated that his type "inhabits the oceans of Europe" and was deposited in the Mus. Doldorff.

Distribution: Mediterranean Sea, northward to the southern coasts of England and southward to the northern and northwestern coasts of Africa.

Material examined: Three males and two small females dredged in 11 fathoms, Casa Blanca, Morocco, August 20, 1924, by the *"Ara,"* William K. Vanderbilt, commanding.

Color: In life the upper surface of this crab is a mottled grayish-green with a yellowish tint, the claw and legs are etched with reddish-orange.

Technical description: Carapace oval, almost subcircular, convex, 31.5 mm. long, 40 mm. wide from tip to tip of lateral spine, interorbital margin 10 mm. wide; frontal teeth three in addition to the preorbital teeth; the medium tooth is triangular, a trifle longer than the lateral teeth, which are also triangular and from which it is separated by a wide, shallow, U-shaped sinus; the sinus between the lateral and preorbital teeth is shallower than that between the median and lateral tooth; the preorbital tooth is weak, the margin sinuate; the superior orbital margin has two closed sinuses; the postorbital tooth is acute, its posterior lateral margin long; there are four teeth on the anterolateral margin besides the postorbital; of these, the postorbital, second and third teeth are subequal, the tips are acute, the anterolateral margin short, the posterior lateral margin long; the fourth tooth has this posterior lateral margin longer than do the others; the fifth or lateral tooth has the tip more acute and upward and outward directed; the posterior margin is confluent with the carinate concave postlateral margins. The upper surface is smooth and finely pubescent. The areolations are weak, except the depressions on either side of the urogastric region and a slight pit anterior to each of these. The male abdominal belt is triangular; five-segmented, the first segment very

A.—*Portunus holsatus* Fabricius, natural size. B.—*Portunus* (*Achelous*) *ordwayi* Stimpson, natural size.

narrow, obscure, the second segment with a sharp transverse median carina; the third, fourth and fifth segments fused, with a sharp transverse carina proximally; the sixth segment is scarcely half as long as the fifth; the seventh segment is small, triangular. The female belt is seven-segmented, moderately oval, with the terminal segment abruptly smaller, triangular; the second and third segments each have a sharp median transverse carina.

The chelipeds are equal, moderately robust, the merus three-sided; the carpus with a strong, acute, triangular tooth at its inner angle, a weaker tooth at its outer angle, the upper surface slightly roughened; the propodus is robust with five strong, longitudinal carinae, the upper and lower of which form the margins; these carinae are continued on the fingers, which are not quite as long as the palms and are regularly toothed with teeth set in clusters of three, the median tooth being the larger; the finger tips are curved, crossing.

The ambulatories are very slender, the carpus, propodi and dactyli are grooved, the propodi being very acuminate, fringed with setae along the inferior margin and a trifle more than one and one-half times as long as the related dactyli.

The natatory legs are unusually robust, the dactyl oval, one and two-fifths times as long as the propodus, which is also laminate, suboval.

The antennae have the basal article greatly enlarged, the free articles very slender, folding transversely.

The antennae have the basal article large, but scarcely at all enlarged at the inferior distal angle, the second and third articles are successively smaller, the flagellum is about as long as the long diameter of the orbit.

The eye is large, reniform; its lower margin crenulate and fringed with long setae, a deep V-shaped sinus on the outer half; the inner angle acute, prominent.

The external maxillipeds have the ischium rectangular, rather narrow, with a longitudinal groove, the inner margin setose; the merus is nearly square, with the distal margin slightly rounded; the inner angle obliquely excavate for the reception of the palp.

Synonymy.—*Portunus holsatus* Fabricius, Entom. Suppl., p. 366, 1798.—H. Milne Edwards, Hist. Nat. Crust., vol. 1, p. 442, 1834. —Bell, Brit. Stalkeyed Crust., p. 109, and text fig. on this page, 1853.

Portunus marmoreus Leach. *op. cit.*, pl. 8.—H. Milne Edwards, *op. cit.*, p. 442.—Bell, *op. cit.*, p. 103.

Portunus lividus Leach, Malacos. Podophth. Brit., pl. IX, figs. 3 and 4 and related text, 1815.

Portunus marmoreus E. L. Bouvier, Results Campagnes Scientifiques par Prince de Monaco, Fasc. XXII, p. 59, 1922. (Under this species Prof. Bouvier states that it is identical with *Portunus holsatus* Fabr. It is of interest to note that Bell, in 1853, made the same decision.)

Subgenus: **ACHELOUS** DeHaan.

Portunus (Achelous) gibbesii (Stimpson).

Plate 59.

Name: This species was named in honor of Lewis R. Gibbes, one of the first American carcinologists.

Diagnostic characters: A small species; carpace oval, lateral spine prominent; two or more silvery spots on each side at the base of the anterolateral teeth. Rostral teeth four small, subequal, the inner pair weaker than the outer; the preorbital teeth weakly bifid. The merus of the swimming legs has a row of acute spines on its posterior distal edge.

Type: Professor Stimpson's type material was "found on the coast of South Carolina by Captain Kurtz, and at St. Augustine, Florida, by Mr. Dorman. These specimens were deposited in the U. S. National Museum.

Distribution: From off Cape Hatteras, N. C., off Fort Macon, Georgia; Egmont Key, Fla., West Florida and Cuba.

Material examined: Two males and two females taken in dragnet, Guantanamo Bay, Cuba, January 17, 1928, by the "*Ara*," William K. Vanderbilt, commanding, establish the first Cuban record for the species and substantially extend its southern range.

Technical description: A small species. Dorsal surface olivaceous green with silvery flecks. Carapace slender, oval, 18 mm. long, 44 mm. wide from tip to tip of lateral spines; frontal margin with four teeth besides the preorbital; the submedian pair of teeth are much smaller than the lateral pair, which form broad triangles and are separated

Portunus (*Achelous*) *gibbesii* (Stimpson), one-half natural size.

by a wide, shallow sinus from the preorbital teeth, which are bluntly rounded and not quite as long as the lateral teeth and are weakly bidentate. The infraorbital tooth is broad, obtusely rounded, very prominent dorsally. There are eight teeth, including the preorbital, on the anterolateral margin; of these the anterior four are wider basally and, although acute, they are less acuminate than the posterior four; the ninth or lateral spine is very slender, pointed outward and upward and is as long as one-third of the distance between the bases of these spines. The upper surface is obscurely granulate and hairy; the cervical and urogastric grooves are well defined; there is a fine, granular ridge curving in from the lateral tooth upon the branchial region. The female abdominal belt is subcircular, the distal joint abruptly smaller, triangulate. The male belt is narrowly triangulate, five-segmented, the third segment with a sharp median transverse carina.

The external maxillipeds have the ischium short, its inner lateral margin broadly convex, the distal margin excavate, with the outer margin subacute; the merus is set obliquely, slightly higher than wide, with the angles rounded, the distal margin convex; the inner angle scarcely at all excavated for the palp.

The antennulae are very slender and fold transversely.

The antennae have the basal peduncular joint produced into an elongate, rounded lobe at its lower distal angle; the second and third articles are short, cylindrical; the flagellum consists of about twenty-five short articles.

The eyes are large, reniform, filling the orbital cavity.

The chelipeds are very long and slender; in old males from six to seven times the length of the carapace; there is one spine at the tip of the inner lateral margin of the ischium; four, occasionally five, spines on the inner margin of the merus, one quite long at the posterior distal angle of the merus; the carpus is elongate, half as long as the palm, with several light longitudinal ridges of granulae; a sharp spine at each the outer and inner distal angles; the palm is very slender, with five longitudinal ridges on the outer face; the uppermost ridge forms the margin and terminates subdistally in a spine; there is also a spine at the base of the third carina, adjacent to the carpus; the fingers are exceedingly slender, slightly longer than the palm, groove on the outer face and set with stocky, triangular teeth.

The ambulatories are very slender, the propodi and dactyli subequal, grooved, the inner lateral margins fringed with setae.

The natatory legs have the four proximal joints stocky, the merus armed at its inner and outer distal angles each with a spine; the propodus laminate, widening distally, the dactyl oval, fringed with setae. Dr. Verrill states that the Bermuda specimens have the merus of the swimming legs armed with five or six small, acute spinules on the posterior lateral margin.

SYNONYMY.—*Lupa gibbesii* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 57, 1862.

Achelous gibbesii STIMPSON, *op. cit.*, p. 22, 1860.—S. I. SMITH, Ann. Rept. U. S. Comm. Fish and Fisheries for 1882, p. 349, issued 1884.—SMITH, *op. cit.*, for 1885, p. 30, issued 1886.—KINGSLEY, Proc. Phila. Acad. Nat. Sci. for 1879, p. 398.—A. E. VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 389, 1908.

Neptunus gibbesii A. M. EDWARDS, Arch. Mus. d'Hist. Nat. Paris, vol. 10, p. 326, pl. 31, fig. 1, 1a, 1b, 1861.—Miss. Sci. Méx. et Amer. Centrale, p. 213, 1879.

Portunus (Achelous) gibbesii M. J. RATHBUN, Amer. Nat., vol. 34, p. 140, 1900; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 140, 1901.

Portunus (Achelous) ordwayi Stimpson.

Plate 58, fig. B.

NAME: Professor Stimpson named this species in honor of Albert Ordway, who as a student of Dr. Louis Agassiz, wrote an important monograph of the genus *Callinectes* (Journ. Boston Soc. Nat. Hist., vol. 7, p. 567). This species is also known as the "silvery clawed crab" because of the iridescent, silvery area on the outer face of the claw.

DIAGNOSTIC CHARACTERS: A smooth, iridescent, silvery area on the outer surface of the cheliped. A curious mask-like figure on the median part of the carapace, formed by the areolations.

TYPE: The type material came from Florida and St. Thomas.

DISTRIBUTION: Known from Cape Hatteras, N. C., southward in the Gulf Stream, throughout the Bermudas and West Indies to Bahia, Brazil. Pelagic.

COLOR: According to Dr. A. E. Verrill: "Specimens with the carapace 32 to 38 mm. long, taken April, 1901, in Castle Harbor, were in

life more highly colored than the smaller ones. The carapace and legs were finely and elaborately variegated and mottled with red, yellowish-brown and gray, producing the general effect of reddish-brown. A small, whitish spot, bordered with brown, appeared behind the bases of the posterior lateral spines. The under side was pale orange, pinkish around the mouth, deeper orange on the chelipeds and legs, and with some spots of orange-brown on the basal segments of the abdomen. The chelae, above, were deep red-brown, the fingers crossed by two light orange-red bands; the iridescent area on the outer surface reflected prismatic colors, but especially green, red and silvery tints."

"Younger specimens, noted by my son, C. S. Verrill, in April, 1898, had the following colors in life: Carapace light gray, with darker shades over the cardiac region and around the edge of the carapace. Ventral surfaces white. Chelipeds light gray, purple at the joints. Ambulatory legs light gray, except the posterior legs, which have a red blotch on the last joint. Eyestalks light gray, the eyes black. Chelae with a brilliant iridescent area." (Extract from Decapod Crustacea of Bermuda.)

Material examined: One male, Bury Island, Bahamas, January 21, 1923; one male from Turtle Harbor, Florida, November, 1924, taken by the *"Ara,"* William K. Vanderbilt, commanding.

Technical description: Carapace oval, 27.5 mm. long, 40.5 mm. wide from tip to tip of lateral spine; frontal margin from tip to tip of preorbital spines 10.5 mm. wide; the preorbital teeth are triangular, acute, separated from the four frontal teeth by a very deep V-shaped sulcus; the four frontal teeth are prominent, subequal, subacute, triangulate, separated from each other by V-shaped sinuses of approximately the same size as the teeth. The inner, inferior orbital angle is dorsally prominent, triangular; there are two closed sinuses on the superior orbital margin; one V-shaped sinus on the outer half of the inferior orbital margin. There are nine teeth, including the postorbital tooth on the anterolateral margin; of these the second to fifth inclusive are subequal and slightly larger than the sixth to eighth teeth, which are narrower basally and also subequal; each of the anterolateral teeth has the tip acute, forward-directed, the posterior lateral margin convex, the anterior margin, concave. The ninth or lateral spine is acute, directed outward and slightly forward and in the males is twice or more than twice as long as the eighth spine. The postlateral margin is shorter than the anterolateral and concave; the posterior margin is

relatively straight. The dorsal surface is convex, granulose and finely pubescent. On the median part of the carapace a series of areolations, composed of granulations, form a curious, sharply defined, mask-like or face-like sculpturation. There is a curved areolation extending from the base of the lateral spine inward to a deep pit at the end of the urogastric line.

The male belt is five-segmented, the third, fourth and fifth segments being fused into one. The female belt is broadly oval, seven-segmented.

The eyes are large, reniform.

The antennulae and antennae afford no specific characters.

The external maxillipeds have the merus almost as long as the ischium, the distal margin unevenly lobate, the inner angle slightly excavate; the outer surface is granular and setose and unevenly concave on the median distal part, and convex below the base of the palp.

The chelipeds are not remarkably long in the male; the merus is as long as half the width of the carapace, three-sided, armed with three or four weak teeth and a dense fringe of long setae; there is one weak spine at the distal angle of the posterior lateral margin of the merus; the carpus has three longitudinal ridges on the outer face and is armed with a slender, acute spine at the inner distal angle, which spine is about as long as the inner lateral carpal margin; there is a weak, acute spine at the outer distal carpal angle; the propodus is as long as three-fifths the width of the carapace, has the upper and lower edges carinate and two oblique, submedian carinae on the outer face; there is a prominent acute tooth proximally just above the upper submedian carina; the superior lateral margin has an acute, up-pointing, subdistal tooth; the fingers are about as long as the palm, slender, tapering, both the inner and outer faces fluted, the cutting edges unevenly dentate, meeting; the tips curved, crossing.

The ambulatories are very slender, the first pair as long as the chelipeds; the second and third pairs slightly decreasing in length; the meral, carpal and propodal joints with longitudinal grooves set with fine pubescence; dactyli exceedingly slender, tapering, acuminate, longitudinally grooved, approximately as long as the two preceding segments taken together.

The natatory legs are short, the ischium, merus and carpus stout; the propodus laminate; the dactyl oval, laminate; the last two segments fringed with setae and with longitudinal areas of pubescence on the wide surfaces.

Portunus (*Achelous*) *sebae* (H. Milne Edwards), natural size.

SYNONYMY.—*Achelous ordwayi* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 148.—S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 9, 1869.—A. MILNE EDWARDS, Archiv. Mus. Hist. Nat., t. X, p. 430, 1861.—RANKIN, Ann. N. Y. Acad. Sci., vol. 11, p. 233, 1898.

Neptunus cruentatus A. MILNE EDWARDS, *op. cit.*, p. 326, pl. 31, fig. 2, 1861.

Neptunus ordwayi A. MILNE EDWARDS, Crust. Miss. Sci. Méx., V, p. 217, pl. 2, 1879.

Achelous ordwayi A. E. VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 381, figs. 28, 29, pl. 18, fig. 3, 1908.

Portunus ordwayi RATHBUN, American Nat., vol. 34, p. 141, 1900.

Portunus (Achelous) ordwayi RATHBUN, Bull. Labr. Nat. Hist. State Univ. Iowa, vol. 4, p. 276, 1898; Bull. U. S. Fish. Comm., vol. 20, part 2, p. 46, 1901; Rapport betreffende een vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 332, 1907.

Portunus (Achelous) sebae (H. Milne Edwards).

Plate 60.

NAME: This species was named in honor of Seba, one of the early European naturalists.

DIAGNOSTIC CHARACTERS: Living specimens are readily recognized by a pair of deep wine-red ocellate spots, one on each side of the branchial region near the margin. There is an acute, upright spine on the basal joint of the swimming legs; also a spine at the outer distal angle of the merus of the same pair of legs.

TYPE: Dr. Milne Edwards' type came from the coasts of Brazil and is deposited in the Paris Museum.

DISTRIBUTION: From North Carolina southward in the Gulf Stream, throughout the West Indies to Brazil.

MATERIAL EXAMINED: One male taken at Porto Padre, Cuba, March, 1928, by the *"Ara,"* William K. Vanderbilt, commanding.

COLOR: Body light olivaceous green, with nearly all the spines lake red at base, with lighter middle and darker tip; the fringes of hair on the body margins and legs are red; there are also a pair of large

ocellate spots, wine red edged with chrome yellow, on the postlateral part of the back, one each above the fourth leg.

TECHNICAL DESCRIPTION: Carapace oval, 26 mm. long, 50 mm. wide from tip to tip of lateral spines; frontal teeth four, of equal length, but the inner pair are wider and blunter than the outer pair, which are acuminate, as are also the preorbital teeth, which are about of the same length as the frontal teeth, from which they are separated by a moderate U-shaped sinus. The eight teeth of the lateral margin are acute-tipped, with points directed forward; the anterior margin of each tooth concave, the posterior margin convex; the lateral spine is very long, acute, forward and upward directed, with a median carina on the upper surface, curving in across the branchial region to the cardiogastric. There is a lightly etched mask-like figure on the median region of the carapace: two transverse, granulate lines, one behind the other, on the gastric region; pits on either side of the cardiogastric region, each side of the cardiac region with a granular eminence. The postlateral and posterior margins have a flattened carina. The upper surface of the carapace and chelipeds is finely setose. The male abdominal belt has a prominent transverse carina on the second segment and another on the third segment.

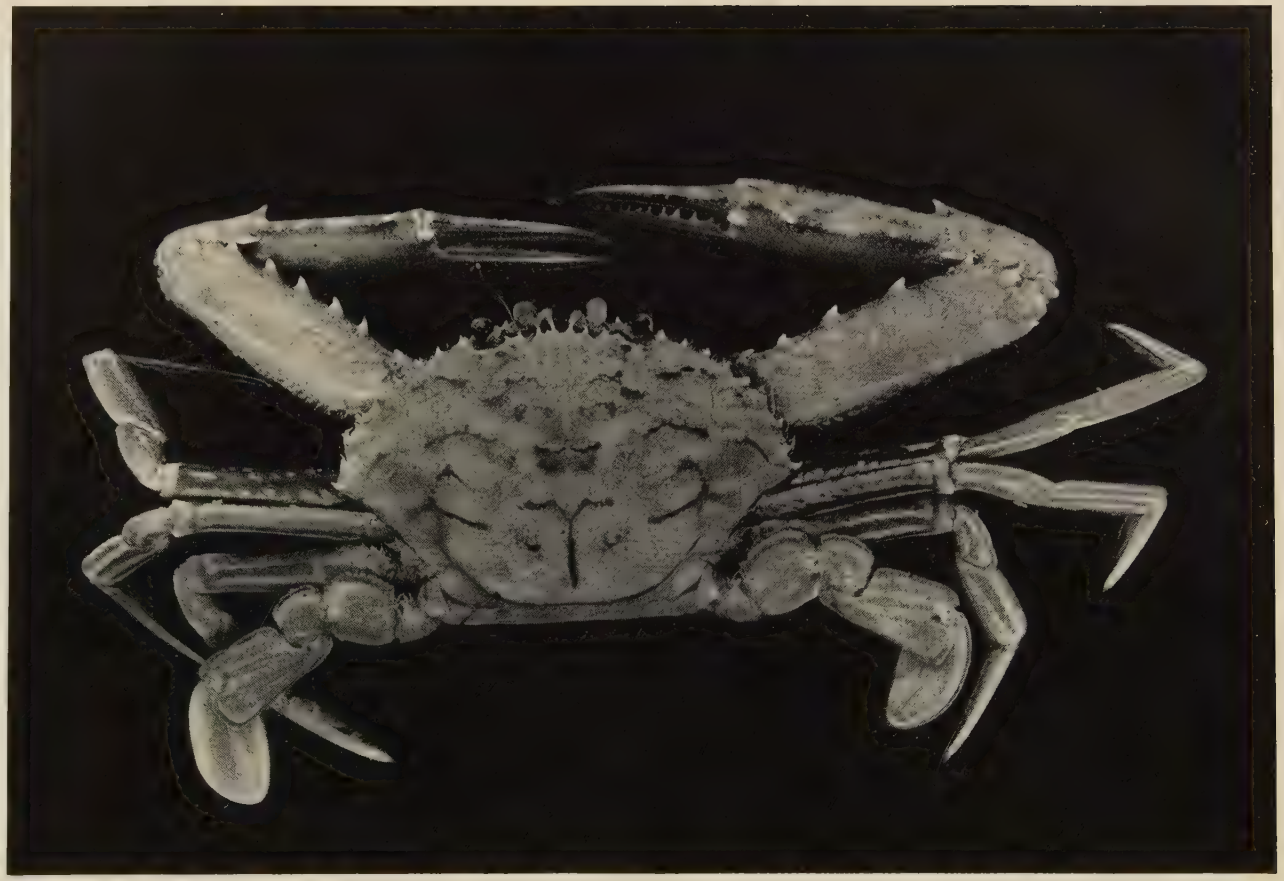
The antennulae are slender and fold transversely.

The antennae have the basal article produced into an oval lobe at the lower distal angle, which fits into the orbital sinus above the infraorbital tooth; the remaining peduncular articles are short, cylindrical, the flagellum is slightly longer than the orbital cavity.

The external maxillipeds have the ischium rectangular, almost square, with a median longitudinal groove, the inner margin fringed with setae; the merus is about four-fifths as long as the ischium, narrow, with the outer margin rounded, the inner distal angle obliquely truncated.

The eyes are large, reniform.

The chelipeds are long, the merus with five teeth on the anterior margin, one, subdistal, on the posterior margin, a heavy fringe of setae on the anterior margin; the carpus has a long, sharp tooth at the inner angle, a shorter tooth at the outer angle, three ridges on the upper surface; there is also a strong spine proximally on the outer face of the propodus adjacent to the median tip of the carpus; the propodus is moderately robust, with four light carinae, two marginal and two intermediate, the uppermost one forming the upper margin and terminating in a weak distal and stronger subdistal, nearly me-



Portunus (*Achelous*) *spinimanus* Latreille, one-half natural size.

dian tooth. The fingers are slender, not quite as long as the palm, tapering, grooved, the upper right with a huge, sub-basal molar tooth, the remaining teeth being a large, triangulate tooth alternated by two smaller triangulate teeth, the edges interfitting.

The ambulatories are slender; the dactyli each about one-fifth longer than the related propodi, grooved; the propodi are also grooved on the outer faces.

The natatory legs are stocky, the basis is produced into an acute spine at the anterior distal angle; the merus is stocky, with two or three spinules across the distal margin and one spine at the posterior distal angle; the dactyl is oval.

SYNONYMY.—*Cancer marinus scutiformis* SEBA, Museum, T. III, pl. 20, fig. 9; figured by LATREILLE under the name *Portunus sanguinolentus* dans l'Encyc. Méth., pl. 272, fig. 6.

Lupea sebae H. MILNE EDWARDS, Hist. Nat. Crust., I, p. 455, 1834.

Neptunus sebae A. MILNE EDWARDS, Arch. Mus. Hist. Nat. Paris, Tome X, p. 329, pl. 28, fig. 2, 1861; Miss. Sci. Méx. et dans l'Amerique Centrale, part 5, tome I, p. 216, 1879-1880.

Achelous sebae S. I. SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 34, 1869.—VERRILL, *ibid.*, vol. 13, p. 380, fig. 27, 1908.

Portunus sebae RATHBUN, Amer. Nat., vol. 34, p. 142, 1900.

Portunus (Achelous) sebae RATHBUN, Bull. U. S. Fish. Comm., vol. 20, part 2, p. 46, 1901.

Portunus (Achelous) spinimanus Latreille.

Plate 61.

DIAGNOSTIC CHARACTERS: Frontal teeth, including the bilobed orbital teeth, eight, the four frontal teeth being decidedly more prominent than the bilobed orbital teeth. Carapace oval, lateral spine weak, transverse areolations very prominent. Natatory legs with the posterior distal end of the merus angled and armed with a spine and a row of denticles.

TYPE: Latreille's type came from the Cayenne, also from Brazil and is deposited in the Paris Museum.

DISTRIBUTION: Pelagic from the Virginia coasts southward in the course of the Gulf Stream to the West Indies, the Bermudas, the Gulf of Mexico and southward as far as Rio de Janeiro, Brazil.

MATERIAL EXAMINED: Three females from Miami, Florida, January 26, 1926. One young specimen and one large male from Guantanamo Bay, Cuba, February 8, 1924. One large male and female dredged in seven fathoms on sandy bottom, Double Headed Shot Cay, Cay Sal Bank, Bahamas, February 18, 1925. All taken by the "*Ara*," William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace oval, 51 mm. long, 81 mm. maximum width, moderately convex, finely pubescent; frontal margin 21 mm. wide, armed with six teeth in addition to the orbital teeth; all six of these teeth are about of equal length, but the convex line of the frontal margin causes the median pair to appear slightly longer; the median pair are acute, triangulate, separated from each other and from the adjacent pair of teeth by wide U-shaped sinuses; the second pair of teeth are also triangulate but are much wider basally and are separated from the outer pair by a much deeper U-shaped sinus; the third or outer pair of teeth approximate the median pair in size and are separated from the preorbital tooth by a shallow, unequal-sided U-shaped sinus. The preorbital tooth is little more than half as long as the others and is triangulate. The superior orbital margin is broken by two small, distinct V-shaped sinuses. The inferior orbital tooth is triangulate, prominent in a dorsal view, nearly as large as the anterolateral teeth. There is one distinct, V-shaped sinus, margined on each side by a denticle on the inferior orbital margin. The anterolateral margin is convex and is armed with nine teeth, including the postorbital tooth; the first eight are approximately equal, triangular, acute, with the tip forward-directed; the ninth or postlateral spine is but very little larger than the preceding ones in old specimens; in young, it is noticeably longer. The postlateral spines are short, concave; the posterior margin is relatively straight. The dorsal surface is convex and granulate, with a few finely beaded ridges, and is finely, evenly pubescent. The epistome has a median tooth.

The antennulae fold transversely beneath the frontal margin.

The antennae have the basal article in the infraorbital sinus, the free peduncular articles cylindrical, the flagellum about twice the long diameter of the eye.

The external maxilliped had the rod-like exognath not quite reaching the outer distal angle of the merus and armed on its lateral margin with a triangular tooth that fits beneath the merus; the ischium is one and one-half times as long as wide, with a longitudinal groove on the outer face, the inner lateral margin slightly convex; the distal

margin excavate. The merus is three-fourths as long as the ischium, with the distal margin broadly rounded; the inner distal angle excavate for the reception of the small three-jointed palp. The inner lateral margins of the ischium and merus are heavily fringed with setae.

The female abdominal belt is seven-segmented, the first segment being extremely narrow, hinge-like; the belt is broadly oval, the lateral margins of the different segments distinctly separated; the fifth and sixth segments much longer than those preceding; the seventh segment is small, triangulate.

The adult male abdominal belt is triangular, five-segmented; the first segment is very short, hinge-like; the second and third segments are the widest of the series, each with a transverse median carina, the lateral margins sharply separated; the third, fourth and fifth segments are completely fused, forming one long segment; the sixth segment is not quite as long as this fused segment; the seventh segment is small, triangular.

The chelipeds of the male are decidedly longer than those of the female; they are slightly unequal in both sexes. Each has the merus three-sided, armed on the anterolateral margin with five teeth, with a small tooth at the postlateral angle; the carpus is armed with teeth; one at the inner basal angle, one smaller at the outer distal angle; the palm has an acute, sub-basal tooth opposite the median distal angle of the carpus. The propodus is about one-fourth longer than the merus, the palm and fingers being of subequal length; there are five carinae on the outer face of the palm, one along the upper margin, a smaller carina immediately below this, a very strong median carina, another halfway between this and the lower margin, which has a carina continuous to the tip of the lower finger. The upper finger has three strong carinae, separated by deep grooves on the outer face, and three carinae on the inner face; the cutting edge of the right claw is armed with a very large, sub-basal tooth, followed by a series of substantial triangulate teeth, smaller ones alternating between the larger ones. The lower finger has two carinae on each the outer and inner face and is similarly toothed; the tips of the fingers are decidedly curved upon each other. The left or smaller claw is similar to the larger one but less robust. The upper and other surfaces of the chelipeds are granulate and finely pubescent, like the body.

The three pairs of ambulatories are slender, similar, successively decreasing slightly in length posteriorly. There are two longitudinal

depressions on the merus, each filled with fine pubescence, one similar depression on the carpus near the outer margin, a median one on the propodus and on the dactyl; that of the latter is not pubescent. The anterior lateral margins of the meral and carpal joints and both lateral margins of the propodus and dactyl are finely setose. The dactyl is strong, acuminate, horn-tipped.

The natatory legs have the three proximal joints stout, fringed with setae on the anterior margins; the propodus and dactyl are subequal, laminate, with the margins fringed with setae, and setose areas on the broad faces.

SYNONYMY.—*?Portunus spinimanus* (part) Latreille, Encycl., tome X, p. 188; Nouv. Dict. Hist. Nat., vol. 28, p. 47, 1819.

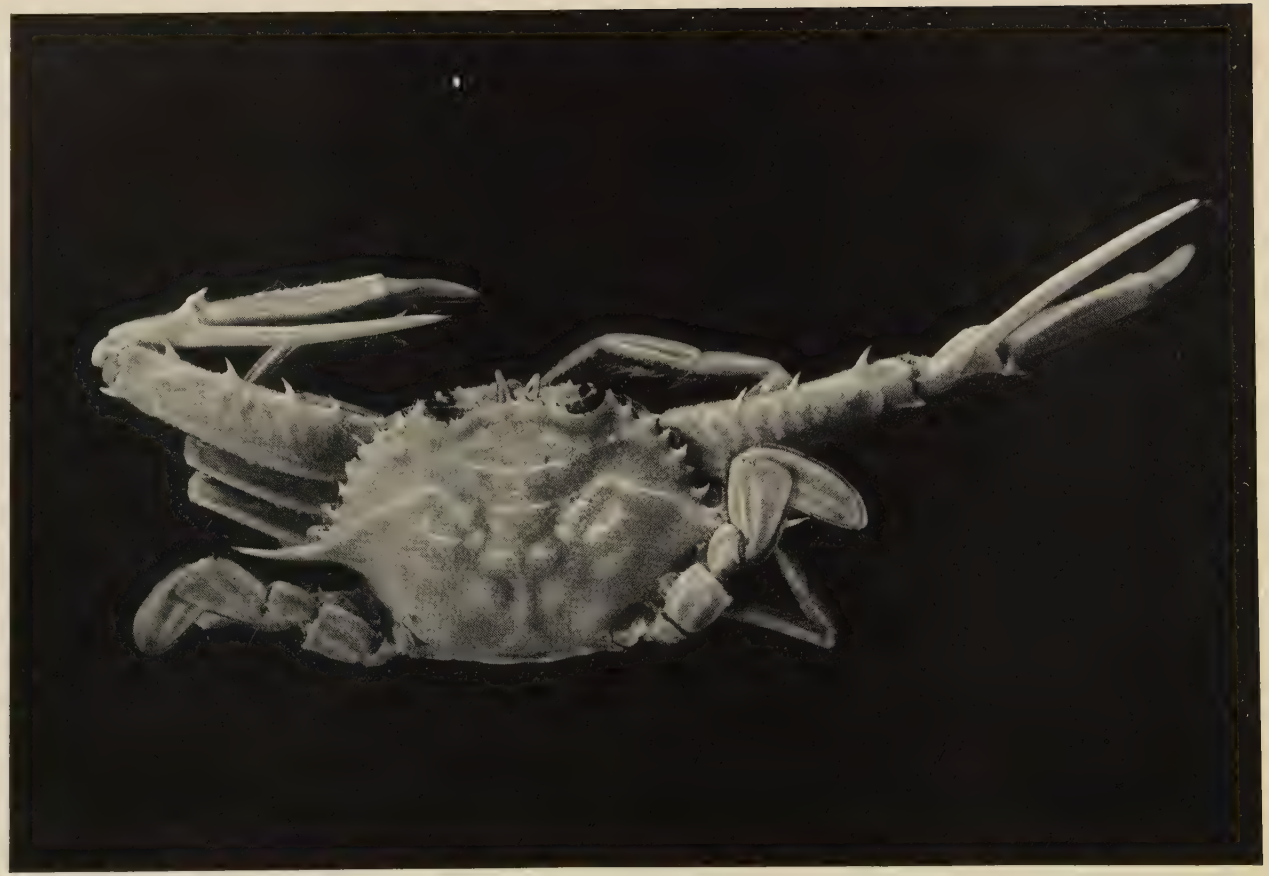
?Lupa spinimana LEACH, DESMAREST, Consid. gen. sur la classe des Crust., p. 98, 1825.—?H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 452, 1834.—GIBBES, Proc. Amer. Asso. Adv. Sci., p. 178, 1850.—DANA, U. S. Explor. Exped. Crust., vol. 13, p. 273, 1852.—STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 57, 1860.

?Achelous spinimanus DEHAAN, Fauna Japonica, Crust., p. 8, 1833.—WHITE, List. Crust. Brit. Mus., p. 28, 1847.—STIMPSON, Ann. Lyc. Nat. N. Y., vol. 7, p. 221, 1860.—A. MILNE EDWARDS (part), Arch. Mus. d'Hist. Nat., vol. 40, p. 341 (not pl. 32, fig. 1, 1*b*), 1861; Miss. Sci. Méx., vol. 5, p. 230, pl. 39, figs. 2, 2*a*, 1879.—S. I. SMITH, Ann. Rept. U. S. Fish. Comm., p. 30, 1886; Amer. Journ. Sci., 2nd ser., vol. 48, p. 389, 1869.—RANKIN, Trans. N. Y. Acad. Sci., vol. 11, p. 233, 1898.—FAXON, Bull. Mus. Comp. Zoöl., vol. 30, p. 154, 1896.—RATHBUN, Amer. Nat., vol. 34, p. 141, 1900.—VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 385, figs. 30, 31, 1908.

Achelous spinimana KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 5, 1878.

Portunus (Achelous) spinimanus RATHBUN, Bull. Labr. Nat. Hist. State Univ. Iowa, p. 276, 1899; Bull. U. S. Fish. Comm., vol. 20, part 2, p. 45, 1901; Rapport betreffende een vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 332, 1907.

Neptunus (Achelous) spinimanus A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, p. 311, 1923.



Portunus (*Achelous*) *spinicarpus* Stimpson, natural size.

Portunus (Achelous) spinicarpus Stimpson.

Plate 62.

Diagnostic characters: This crab is readily distinguished from all its American allies by the presence of an extremely long spine at the inner angle of the wrist. In adult males this spine attains a length exceeding that of the palm.

Type: Founded on a series of specimens taken by the *"Blake"* at seven stations in the Florida Reefs; *i.e.*, off Tortugas, 13 fms., off Carysfort Reef, 40 fms., off Conch Reef, 49 fms., off Alligator Reef, 53 fms., off Pacific Reef, 60 fms., Lat. 31° 31′, Long. 79° 41′, 74 fms., and off American Shoal, 53 fms., and deposited in the Museum of Comparative Zoölogy.

Distribution: Known from Cape Hatteras, N. C., southward in the course of the Gulf Stream through the West Indies to Trinidad, and also at Sabanilla, Colombia, in depths ranging from 3 to 150 fms.

Color: Unknown.

Material examined: Port Antonio, Jamaica, February 17, 1928, one male; three males taken 14 miles S. W. of Marquesas Keys, Florida, dredge down 30 fms., March, 1924; one young specimen taken in five fathoms, American Shoal Light, Florida, March 3, 1924; one young male taken at Roncador Bank, Caribbean Sea, January, 1928, by the *"Ara,"* William K. Vanderbilt, commanding.

Technical description: Carapace oval, produced at the lateral angle into an acute outward-pointing spine which is about one-fourth as long as the width of the carapace between the base of the spines. Dorsal surface convex, decidedly uneven, there is a transverse arcuate line of beaded granules on the mesogastric region, a shorter line behind this and subparallel to it; a long curved ridge of beaded granules running in from the base of the lateral spine to the ends of the deep urogastric line and bordered anteriorly by a groove. Two rounded prominences on the cardiac region composed of rounded granules. The entire dorsal surface is finely pubescent. The frontal margin is slightly arched and is armed with six triangulate teeth, including the postorbital pair. The submedian pair are separated by a wide U-shaped sinus but are nearer to each other than they are to the submedian pair of teeth from which they are separated by an even wider U-shaped sinus. The sinus between the submedian and preorbital

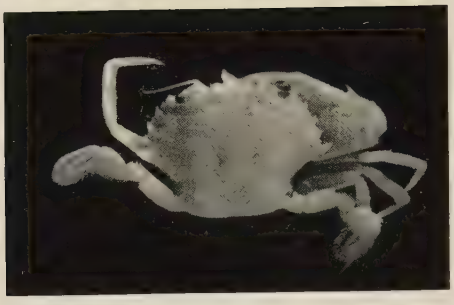
teeth is deeper than those between the other teeth and is unequally proportioned, the inner side being the longer and more arcuate, the outer side is abrupt, relatively straight. The outer pair of teeth are wider and a trifle longer than the submedian teeth, and the preorbital teeth are acute, not quite as long as the median pair; just behind the preorbital tooth and separated from it by a shallow sinus; there is on the superior orbital margin a second obtuse tooth; there are two open, V-shaped sinuses on the superior orbital margin; the postorbital tooth is small, acute; the inferior orbital margin has one wide sinus below the postorbital angle; the lower margin is sinuate and beaded; the inferior inner orbital tooth is broad, triangulate and more prominent than any of the teeth of the frontal margin. There are eight small, triangulate, acuminate teeth on the lateral margin; of these the second, fourth, sixth and eighth are a trifle smaller than the alternate teeth. The postlateral margin is sinuate; the posterior margin is about as wide as the space between the postorbital angles and is relatively straight. The male abdominal belt is composed of five articles, the first and second segments being wide and transversely keeled, the third, fourth and fifth segments being completely fused; the sixth segment narrows distally, the seventh segment is small, triangulate. The sternal plastron is broad, the segments sharply defined.

The antennulae have the basal article greatly enlarged, the free articles very slender, folding obliquely.

The antennae have the basal article extending so that its inner distal margin of the article is produced in two node-like processes; the free second and third articles are small, the flagellum is very slender, about one and one-half times the length of the orbit.

The external maxillipeds have the merus rounded, somewhat flaring on its outer distal border.

The chelipeds of the male are exceedingly long and slender, more so than those of the female. The male chelipeds have the merus as long as the carapace between the base of the lateral spines; it is three-sided, with the anterior lateral margin armed with four weak and widely spaced, obliquely outward pointing spines, and the posterior distal angle is armed with one outpointing spine; the upper surface is rough with granules, frequently set in the form of arcuate, transverse rugae; the carpus is not quite one-third as long as the merus and is armed with a very small, subdistal spine on its lower lateral margin, and has the inner distal angle produced into an extremely long, carinate spine which has its acute tip reaching to one-third the length of the



Portunus (*Achelous*) *depressifrons* (Stimpson), young, natural size.

fingers, or is equal in length to the merus; in young males and in females this spine, though long, is less produced than in old males. The propodus, including the fingers, is one-fourth longer than the merus, the fingers being slightly more than one-third of this length. The lateral margins are carinate and there is a beaded line below the upper margin and two more prominent beaded lines which are obliquely median. The fingers are slender, tapering, each with two carinae on the outer face, the cutting edge dentate, meeting.

The ambulatories are very slender, the third pair the shortest, the other two pairs being subequal. The carpus and propodus are carinate laterally, the dactyl long, acuminate, with a longitudinal groove, the lateral margins heavily fringed. The natatory legs have the merus and carpus stout, thick, the propodus and carpus broadly laminate.

SYNONYMY.—*Achelous spinicarpus* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, p. 149, 1870-1871.

Neptunus (Hellanus) spinicarpus A. MILNE EDWARDS, Miss. Sci. México, tome V, p. 221, pl. 40, fig. 1, 1879; Bull. Mus. Comp. Zoöl., vol. 8, p. 11.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, p. 312, 1923.

Portunus spinicarpus RATHBUN, Amer. Nat., vol. 34, p. 142, 1900.

Portunus (Achelous) spinicarpus RATHBUN, Bull. Labr. Nat. Hist. State Univ. Iowa, vol. 4, p. 276, 1898; Bull. U. S. Fish. Comm., vol. 20, part 2, p. 47, 1901.

Portunus (Achelous) depressifrons (Stimpson).

Plate 63.

DIAGNOSTIC CHARACTERS: Lateral spine but little longer than those anterior to it; front not prominent, four subequal, frontal teeth; orbital tooth broad but not bifid. A curious mask-like figure formed by areolations on the dorsal surface of the carapace. Chelipeds with a single distal spine on the hand.

TYPE: Stimpson founded the species on material "found on the coast of South Carolina, by Captain Kurtz, and there are specimens from the Florida Keys in the Smithsonian Museum."

DISTRIBUTION: Known from Cape Hatteras, N. C., to the Antilles.

MATERIAL EXAMINED: One small male, Cardenas, Cuba, taken by the *"Ara,"* William K. Vanderbilt, commanding.

Color: In life this crab has the upper surface of its body and legs, except the second pair, which are purplish-blue, irregularly mottled with light and dark grey, closely imitating the color of the sand into which the crab frequently flattens itself to lie in wait for its prey.

Technical description: Young male: Carapace oval, nearly subcircular, 12 mm. long, 17.5 mm. wide from tip to tip of lateral spines; interorbital space 5.5 mm. wide; frontal teeth four, shallow, broadly rounded, the inner pair slightly narrower than the outer; the orbital teeth also rounded, but smaller than the frontal teeth; the margin sinuate but not bifid; the lateral margin is armed with eight teeth, all acute; the second, fourth, sixth and eighth teeth are subequal and are smaller than the alternating teeth; the ninth or lateral tooth is but very little longer than the others and is curved slightly forward. The anterolateral margin of the carapace is fringed with setae. The postlateral and posterior margins are lightly carinate. There is a curious mask-like figure outlined in areolations on the gastric region. The areolations of the carapace are sharply defined and the transverse ridges have sharp, granulose edges. The depressed areas are finely pubescent.

The chelipeds are very long in the adult, much less so in young specimens; the merus has five, occasionally six, unequal spines on its anterior margin, none at the posterior distal angle; the carpus has strong spine at the inner angle, a shorter one at the outer angle; three interrupted granulate carinae on the upper surface; the palm is high, longer than the fingers, with five longitudinal, granulate carinae, the uppermost of which terminates in an acute, subdistal tooth. The fingers are grooved, subequal, the upper right one with a large, subbasal tooth.

The ambulatories are very slender, the first pair exceeding the others; all have the three distal segments heavily fringed with setae on the lower margins.

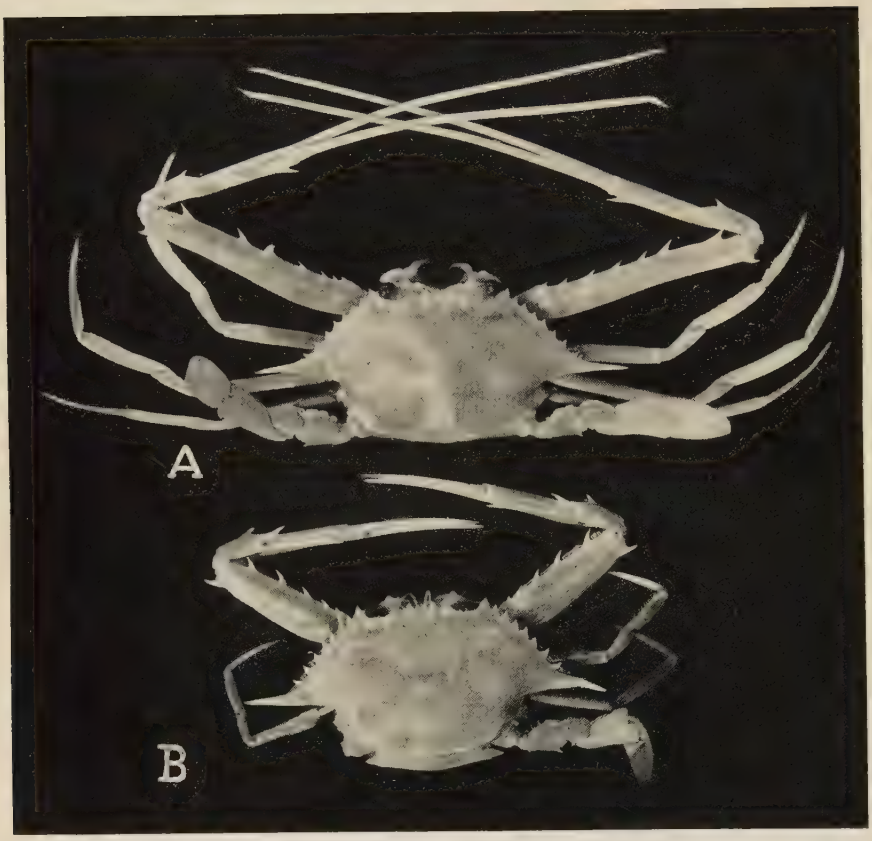
The natatory legs have no spines, the dactyl is oval.

The eyes are large, reniform.

The antennulae are extremely slender and fold transversely.

The basal joint of the antennae has the inferior distal angle produced into a very short, bluntly rounded node.

The external maxillipeds have the ischium short, rectangular, the merus narrow, its inner distal angle but little excavate, the distal margin only slightly rounded; outer face of both densely setose.



Lupella forceps (Fabricius). A, male; B, female; natural size.

SYNONYMY.—*Amphitrite depressifrons* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 58, 1859.

Achelous depressifrons STIMPSON, *op. cit.*, p. 223, 1860.—A. MILNE EDWARDS, Arch. Mus. Hist. Nat., vol. 10, p. 342, 1861; Miss Sci. Méx., t. V, p. 230, pl. 40, figs. 4-4a, 1879.—COUES, Proc. Acad. Nat. Sci. Phila. for 1879, p. 121.—KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 5, 1878.—RANKIN, Ann. N. Y. Acad. Sci., vol. 11, p. 233, 1898.

Achelous depressifrons VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, p. 391, text fig. 36, pl. 20, fig. 3, 1908.

Neptunus depressifrons MIERS, *"Challenger"* Zoöl., Brachyura, vol. 17, p. 181, 1886.—RANKIN, *op. cit.*, vol. 12, p. 531, 1900.

Portunus (Achelous) depressifrons M. J. RATHBUN, Bull. Labr. Nat. Hist. State Univ. Iowa, p. 27, 1898; Bull. 20, part, 2, U. S. Fish. Comm., p. 45, 1901; Amer. Nat., vol. 34, p. 140, 1900.—Rapport betreffende een vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 332, 1907.

Neptunus (Achelous) depressifrons MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, p. 312, 1923.

Genus: **LUPELLA** Rathbun.

Lupella forceps (Fabricius).

Plate 64, figs. A and B.

DIAGNOSTIC CHARACTERS: Chelipeds long and slender, more so in the male than in the female; fingers exceedingly attenuated, longer than the maximum width of the carapace, including the lateral spines.

TYPE: Fabricius simply states: *"Habitat in Oceano."*

DISTRIBUTION: Rather rare in the West Indies. Taken at only four stations by the *"Fish Hawk"* Porto Rican cruise. Pelagic.

MATERIAL EXAMINED: One large male and one large ovigerous female taken in Guantanamo Bay, Cuba, February 4, 1924, by the *"Ara,"* William K. Vanderbilt, commanding. One young specimen taken in dragnet, Port Antonio, Jamaica, 6 A. M., February, 1926. One large male from the same locality; color plate made by Mr. W. E. Belanske.

Color: Mr. Belanske's color plate of this species shows the upper surface of the carapace to be light olivaceous, while the chelipeds and legs are lilac lavender, the dactyli of the fifth legs have the lavender deepening into blue.

Technical description: Carapace hexagonal, transversely elongate, frontal region with two pairs of teeth, besides the preorbital teeth; of these the inner pair are triangular, separated from each other by a V-shaped space, and are not quite so long as the outer triangulate pair, from which they are separated by a wider, unequal-sided U-shaped space. The outer pair of teeth are well separated by a concavity from the relatively obscure preorbital angle. The anterolateral margin is armed with eight small, approximately subequal triangulate teeth, including the postorbital tooth, well separated by wide sinuses; the lateral angle is produced into a ninth, conspicuously long, acuminate, outpointing spine; the postlateral margin is concave; the posterior margin is broad and relatively straight. The dorsal surface has the urogastric and cervical grooves well defined and is microscopically granulate. The epigastric and epibranchial lines are well defined. The epistomal tooth is acute, not projecting beyond the frontal margin. The inferior orbital tooth is broadly triangulate and more conspicuous than the superior orbital tooth. There is one straight, closed sinus midway the superior orbital border and near the postorbital tooth; there is a small, acute tooth on the orbital border. The male abdominal belt is T-shaped, five-segmented, the third, fourth and fifth joints fused; the penultimate segment nearly twice as long as wide; the terminal segment triangulate with its distal margin broadly rounded. The female belt is oval, seven-segmented; the first segment is small, nearly concealed beneath the carapace; the second segment is small, transversely carinated, its lateral margins oblique; the third segment is narrower, its lateral margins rounded; the fourth segment is about twice as long as the third and is abruptly wider with its lateral margins rounded; the fifth segment is one and one-half times as long as the preceding one and narrower, its outer margin convex, converging; the last segment is small, subtriangulate, its outer margins convex.

The eyes have the stalks short, constricted below the cornea, which is spherical and is set obliquely terminal.

The antennulae have the free joints very slender, cylindrical and folding transversely beneath the frontal border.

The antennae have a prolongation of the basal joint firmly united

with the inner suborbital angle; the first free joint is stout; the second one is slender, cylindrical; the flagellum is tapering, multiarticulate, slightly longer than the eye.

The external maxillipeds have the ischium nearly as wide as long, the distal margin diagonal, the merus nearly as long as the ischium, with the outer lateral and distal margins produced into a convex lobe; the inner distal margin slightly excavate for the reception of the three-jointed palp, the last two segments of which are compressed, lamellate.

The chelipeds in the adult male have the ischium short, terminating in an acute spine at the anterior distal angle, the merus is about as long as the width of the body between the bases of the lateral spines and is rather flattened dorsally, the anterior margin armed with six acute, outward-pointing spines of unequal size and spacing, the proximal three being smaller and closer together; the fifth spine is nearly twice as far from the sixth as the fourth is from the fifth; the posterior lateral margin bears a single distal spine; the carpus is short, slender and armed on the upper surface with a subdistal spine on each lateral margin; the palm is about one-third as long as the merus, very slender; armed with an acute spine on the superior basal margin and with another subdistal acute spine on the inner lateral margin; the fingers are fantastically long and slender, exceeding the length of the carapace from tip to tip of the lateral spines by five or six millimeters. The outer lateral face of each finger bears a light carina, as does also the palm; the cutting edge is set with weak teeth, among which occur at fairly regular intervals slightly larger teeth. The young males have well-developed chelipeds, which are only half to two-thirds as long as those of the adult males. The larger females have the meral joint only three-fifths as long as the width of the body between the base of the lateral spines; the propodus has the palm and fingers of equal length, the fingers being equal to scarcely one-third the maximum width of the body.

The first, second and third ambulatories are very slender; the first and third pairs are subequal in length; the second pair exceeds these by half the length of its dactyl; the third pair is even frailer than the other two pairs. All have the dactyli sabre-like, acuminate, approximately as long as the related propodus.

The natatory legs are the stoutest and shortest of the series; the suboval meral joint has a single subdistal spine on the posterior lateral

margin; the propodus and dactyl are both enlarged, laminate, together forming an oar-blade-like expansion.

SYNONYMY.—*Cancer* 4, PATRICK BROWNE, Nat. and Civil Hist. of Jamaica, p. 421, pl. 41, fig. 2, 1756.

Cancer forceps FABRICIUS, Entom. Syst. auct. et emend., II, p. 449, 1793.

Portunus forceps HERBST, Naturgh. Krabben und Krebse, pl. LV, fig. 4, 1794.—LATREILLE, Encycl. Méth., t. X, p. 190, 1812-25.

Lupa forceps LEACH, Zoöl. Misc., vol. I, p. 123, pl. 54, 1814.—DESMAREST, Consid. sur les Crust., p. 99, 1825.—LATREILLE, Régne animal, 2ed., t. IV, p. 34, 1825.—H. MILNE EDWARDS, Hist. Nat. Crust., t. I, p. 456, 1834.—A. MILNE EDWARDS, Ann. Sci. Nat. Zoöl., 4e serie, t. XIV, p. 214, 1861.—Archiv. du Museum, t. X, p. 351, pl. 1, fig. 1, 1858; Miss. Sci. au Méx., p. 208, 1880.

Lupella forceps RATHBUN, Ann. Inst. Jamaica, vol. 1, No. 1, p. 22, 1897; Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 50, 1901.

Subfamily: **Podophthalminae.**

Genus: **EUPHYLAX** Stimpson.

Euphylax dovii Stimpson.

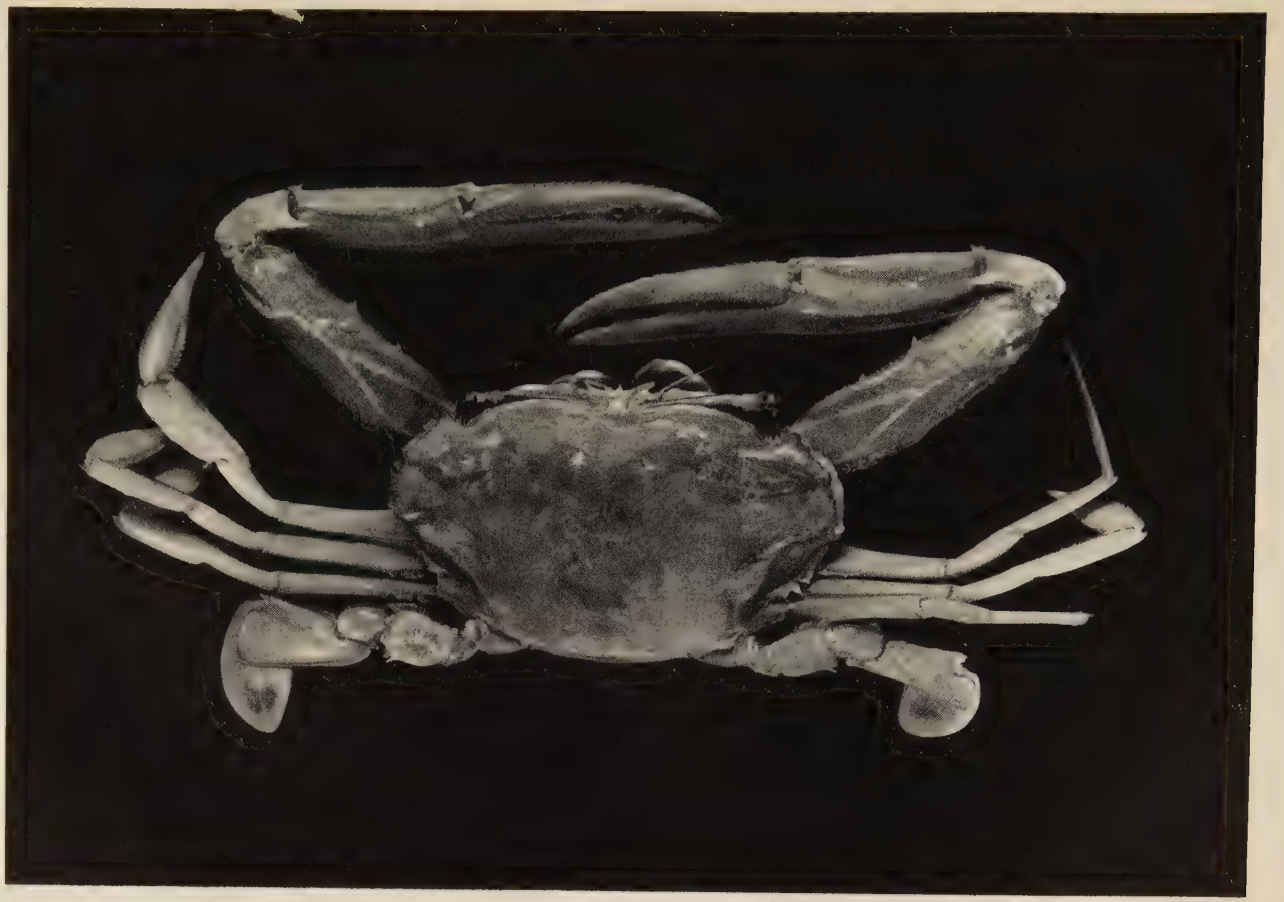
Plate 65.

NAME: This crab was named in honor of its collector, Captain Dow, who secured many new and rare animals from the West Coast of America. It is also known as the "periscope-eyed crab."

DIAGNOSTIC CHARACTERS: There are but two species so far described in this genus. Both are confined to the West American coast from the Gulf of Lower California southward to the Perlas Islands. *E. dovii,* the genotype, is readily distinguished in the field by its magnificent amethystine and coral red coloration. *E. robustus** is said to have the carapace green, the legs green, tinted with yellow and yellowish-red. *E. dovii* has five teeth, counting the orbital tooth, on the anterolateral margin; all of these are mere denticles, except the orbital tooth; *E. robustus* has only four anterolateral teeth, of which only the

---

*FOOTNOTE.—*Euphylax robustus* A. MILNE EDWARDS, Lés fonds de la mer, t. II, p. 249, 1874; Miss. Sci. México et dans l'Amerique Centrale, t. V, p. 205, pl. 37, 1881.



Euphylax dovii Stimpson, male, one-half natural size.

second is reduced, the first (orbital), third and fourth are long, strong, triangulate teeth. The chelipeds of *dovii* are much slenderer than those of *robustus;* the spines on the anterior lateral margin of the merus of *dovii* are much feebler than those of robustus.

DISTRIBUTION: West Coast of Central America (type locality); down to Peru. Rare.

MATERIAL EXAMINED: One male taken in-shore, Wafer Bay, Cocos Island, March 5, 1926.

COLOR: Adult male—carapace nigrosin violet, shading into litho purple toward the edges and on the legs; frontal and lateral areas of body and basal two-thirds of first, second and fourth natatory legs pleroma violet shading into lavender violet. Terminal joints of fourth natatory legs coral red shading into pleroma violet basally. Chelipeds pleroma violet ventrally, light magenta dorsally on the basal half; carpus, propodus and fixed fingers deep vinaceous red; both fingers conspicuously marked with malachite green. Eyestalks litho purple; cornea shining, lilac gray.

HABITS: Far out at sea, where the endlessly shifting miracle of indescribably exquisite colors jewel the Pacific, the loveliest of the swimming crabs, *Euphylax dovii,* makes its home. One half glimpses a fragile, amethystine creature pulsing with sea-rhythm through the amethystine lights and shadows. Closer inspection reveals the exceeding length and slenderness of limb and delicately delineated carapace that typify the strong swimmer. From the powerful, long, slender, splendidly toothed claws one may infer that this species is aggressively predatory.

TECHNICAL DESCRIPTION: Adult male: The carapace is irregularly oval, with the anterolateral margin evenly rounded and ornamented with four small teeth and the postlateral margins decidedly convergent. The interorbital region is decidedly narrow between the bases of the eyestalks, but widens immediately beyond into a T-shaped process, which latter has its frontal margin relatively straight, lightly carinated, with a minute median notch. The frontal margin of the carapace on either side of this process is finely beaded; behind this, for distance equivalent to the length of the eyestalk, there is a strip of dorsal surface of the carapace whose inner angulated edge forms the inferior margin of the cavity into which the eyestalk fits; the inferior orbital margin below the cornea is decidedly concave, finely

beaded. The superior orbital margin is gently convex along the proximal two-thirds of its length and decidedly concave on the distal third above the cornea; this concave area is separated at the inner angle by a brief closed sinus; the outer, or distal angle, is produced into a sharp, triangulate tooth. The entire superior orbital margin is finely beaded and fringed with close-set, silky setae, as is also the inferior orbital margin. The first lateral tooth behind the orbital is a minute denticle, scarcely protruding beyond the marginal line and situated about 4 mm. behind the apex of the orbital tooth; the second lateral tooth is similar to and is about as far behind the first tooth as the first lateral tooth is posterior to the orbital tooth. The third lateral tooth is weaker than the second, from which it is separated by a distance about equal to that between the second tooth and the orbital tooth. The fourth lateral tooth is the strongest of the series, except the orbital tooth, the distance between it and the third tooth being slightly greater than that between the second and third teeth. The dorsal surface of the carapace is glabrous, moderately convex, finely punctate; a series of larger punctae approximately parallel the frontal margin; others are prominent in the cervical groove. The cardiac region is more protuberant than the gastric region. The cervical and urogastric grooves are rather deep. The lateral margins of the carapace and the inferior and superior orbital margins are fringed with a series of fine, short, close-set, silky setae.

The male abdomen is triangulate, five-segmented; the first and second segments are short, but successively increase in length; the third, fourth and fifth segments are anchylosed, but with the lines of fusion clearly delineated; the sixth segment is as long as the fused fourth and fifth segments; the seventh segment is only about half as long as the sixth and is small, triangulate. The larger, stout, curved male appendages have their distal part flattened like a blade and tapering at the tip, which reaches to midway the sixth abdominal segment.

The male chelipeds are quite long, slender, but well developed although less robust than are those of *E. robustus.* The merus of *dovii,* which is anchylosed with the ischium, is three-fourths as long as the major width of the carapace; the upper surface is flat, glabrous, the anterior lateral margin armed with three major equidistant teeth and a few additional, irregular denticles and a short fringe of setae; a similar fringe is present on the postlateral margin; the carpus is short, knob-like, with the upper surface slightly convex, a long, spine-like process at the inner lateral angle, a much shorter one at the outer

lateral angle, a slight curved row of denticles on the proximal half of the dorsal surface; the propodus, including the dactyl, is fully one and one-half times as long as the merus; laterally compressed but moderately robust; armed on the superior and inferior lateral margins with carina-like rows of denticles, also with one such carina in the median line of the inner lateral face of the propodus and an isolated denticle above this carina; three similar denticled carinae occur on the outer face of the propodus. The inferior dactyl comprises half the propodal length; is strong, rather flattened, tapering to a sharp, upcurved point; the cutting edge of the inferior dactyl is armed with five major groups of teeth, each group consisting of a large triangular tooth, on either side of which is a small triangulate tooth. The hinged finger is similar to the inferior finger, but is slightly slenderer and more curved. It also has five major groups of teeth which interfit with those of the lower finger.

The first, second and third pairs of ambulatories are similar, but the tip of the third pair only reaches to midway the distal joint of the second pair. Each of these legs has the merus elongate, subcylindrical; the carpus, short, compressed; the propodus, broadly flattened, blade-like, with the lateral margins fringed with setae; the dactyl, also flattened and fringed, a little longer than the propodus and tapering to a very acuminate apex. The last pair of legs are modified as natatory organs, as in the *Portunidae;* the basis, ischium, merus and carpus are stocky, short; the merus has a single spine placed subdistally on the postlateral margin; the propodus is as long as the merus and carpus taken together but is flattened blade-like with the posterior distal region especially produced; the dactyl is broadly oval, flattened, as long, or a trifle, longer, than the propodus. The lateral margins of the distal four joints of this pair of legs is fringed with short, fine setae.

The antennules have the proximal joints slender, well-developed; the flagellum two-branched, rudimentary; all fold transversely in the septum.

The antennae have the peduncular joints situated in the orbital sinus, and a long, slender flagellum which is a little longer than the antennulae.

The peculiarly developed eyestalk is stout, cylindrical, with a joint at the base of the spherical cornea; a rounded, tongue-like process of the stalk projects on the median dorsal surface of the cornea; the

diameter of the cornea is from two to two and one-half times that of the stalk.

SYNONYMY.—*Euphylax dovii* STIMPSON, Ann. Lyc. Nat. Hist., vol. 7, p. 93, pl. 3, fig. 5, 1860.—A. MILNE EDWARDS, Miss Sci. Méx., p. 204, pl. 38, fig. 2, 1880.—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, p. 578, 1910.

Family: **GONEPLACIDAE.**

Subfamily: **Goneplacinae.**

Genus: **GONEPLAX** Leach.

Goneplax tridentata (A. Milne Edwards).

Plate 66, fig. A.

DIAGNOSTIC CHARACTERS: Carapace box-like, frontal border straight, anterolateral margin with three sharp anterolateral teeth, including the postorbital.

TYPE: The type was taken by the *"Blake"* at station 287, Barbados, in 7½ to 50 fms., and is deposited in the National Museum d'Histoire Naturelle, Paris.

DISTRIBUTION: Hitherto known only from the type locality, Barbados, 7½ to 50 fms., and one specimen from Glover Reef, Caribbean Sea, 484 fms. The *"Ara"* specimen adds a third record for this species, off Alligator Reef, Florida, 150 fms., thus substantially extending the northern range of this rare species.

MATERIAL EXAMINED: One large specimen dredged off Alligator Reef, Florida, 150 fms., March 30, 1926, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace about one-sixth wider than long, interorbital space about one-third of width, with the frontal lateral margin straight in a dorsal view, but slightly sinuate and with a minute inferior, median dorsal tooth when viewed from the front; frontal border with the terminal angles acute, slightly deflexed and separated from the inner superior orbital angles by an acute incision. The dorsal orbital margin is elliptical, nearly as long as the frontal border and sinuate. The anterolateral borders are produced into three strong, forward-directed, subequally spaced teeth, of which the first or postorbital is minutely broader basally and more forward

A.—*Goneplax tridentata* (A. Milne Edwards). B.—*Goneplax angulata* (Pennant), both natural size.

directed than the second and third teeth, which are subequal and outward and forward directed. The postlateral margins are subparallel; although the moderately tumid hepatic regions contrasted with the deflexed posterior branchial regions of the carapace cause the lateral margins to seem more convergent; the posterior margin which is slightly sinuate but roughly parallels the general trend of the anterior margin. The regions of the carapace are distinctly delineated; the mesogastric region is moderately inflated, forming a broad, transverse oval on the anterior part of the carapace, which is defined by the cervical grooves laterally and is confluent posteriorly with the urogastric area, which is indicated by very deep depressions on each side connected by a transverse channel; two deep grooves contiguous anteriorly with the urogastric depressions curve around the cardiac-intestinal area and are united posteriorly by a faint transverse depression parallel to and near the posterior margin of the carapace. The side walls of the carapace are deeply vaulted; the pterygostomian region is prominent. The epistome is well developed and prominent.

The eyes are large and fill the ocular cavity, the stalks are short, cylindrical; the cornea is conspicuously dilated and about as long as the stalk.

The antennulae have the basal article filling more than half the fossett, dilated basally, curved and constricted distally, the second article is long, very slender, cylindrical, the third article similar, but a trifle shorter and slenderer; the flagella are quite small, less than half the length of the preceding joint, the smaller branch consists of five slender, tapering articles; the stouter branch consists of thirteen conically tapering articles which bear a thick, plumose brush on the ventral side.

The maxillipeds have a small, basal article, a long, rectangular exognath which is produced on the inner margin adjacent to the base of the merus into triangular process which interfits with the merus of the endognath; the palp of the exognath is longer than the basal article and very slender; it consists of a basal article as long as half the width of the merus and about 16 small, subequal tapering rings which are set along the outer margin with very long, feathery setae. The ischium of the endognath is rectangular, one and one-half times as long as wide; the merus is squarish, with the lower inner margin a little rounded; the palp arises from the inner distal angle of the merus, is rounded and consists of three tapering joints which curve downward beside the inner margin, extending to near the middle of

the ischial margin. The inner margin of the ischium and merus are fringed with long, spinose setae which practically cover the space between the opposing maxillipeds, forming a sieve which is augmented by the similar setae on the palp.

The male abdomen is seven-segmented, narrow, with a triangulate tip. It is well figured in my "Crustacea from Tropical East American Seas," p. 12, figs. 3 and 4, but the latter figure is unfortunately labelled "female" abdominal belt; it should read "*male*" abdominal belt.

The male chelipeds are well developed, almost equal in size. The ischium is short, slender and produced on the anterior-ventral margin to an acute point; the merus is long, three-sided, much broader distally and armed on the inner dorsal margin with an upward pointing spine situated a little distance behind the distal margin, which is produced to a similar but slightly less protuberant tooth at the outer upper edge. There is a conspicuous tuft of close-set plumose setae on the distal upper frontal regions of the merus. The carpus is nearly two-thirds as long as the merus; the propodus is quite large, being a trifle longer than all the preceding segments taken together. It is no wider basally than the carpus and is produced on its upper margin into a smaller tooth-like process at the base. The propodus widens conspicuously, attaining its greatest width at the base of the propodal finger. The outer basal surface of the propodus bears a tuft of setae. It is very convex on the outer surface, but much more inflated on the inner surface. The propodal finger is nearly half the length of the propodus, is triangulate, laterally compressed, marked on its outer surface by a decided longitudinal groove near and approximately parallel to the central margin. The tip of the propodal finger is strongly upcurved. The inner cutting edge is divided into six teeth. The hinged finger is set obliquely and its cutting edge is in complete apposition with that of the propodal finger. It bears two small teeth basally, then a very large, obtuse tooth followed by two small teeth, the finger tip curves downward and crosses upon that of the lower finger. The smaller cheliped differs only in size and in having less prominent teeth along the cutting edge of the finger.

The ambulatory legs are quite long and slender, the first three pairs are smaller and subequal; the fourth pair is similar in structure but does not quite extend to the tip of the propodal joint of the third leg; the ischium is short and decidedly slenderer. The first legs are subequal. The merus is decidedly the longest joint of the limb and is

decidedly laterally compressed; the carpus is small, only about one-fourth as long as the merus, very narrow basally and dilated distally; the propodus is about a third longer than the carpus and is as wide throughout its length as the carpus is distally. The dactyl is a trifle longer than the propodus and is very slender, tapering to an exceedingly acuminate point; moderately convex on its outer surface and produced to a prominent tooth midway its upper or dorsal margin; the anterior inner face of the carpus below this tooth is covered with a mat of close-set plumose setae.

SYNONYMY.—*Frevillea tridentata* A. MILNE EDWARDS, Bull. Mus. Comp. Zoöl., vol. 8, p. 16, 1880.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, p. 338, pl. 6, fig. 3, 1923.

Goneplax tridentata RATHBUN, Bull. 97, U. S. Nat. Mus., p. 29, 1917.—BOONE, Bull. Bingham Oceanog. Coll., vol. 1, art. 2, p. 10, figs. 2, 3 and 4, 1927.

Goneplax angulata (Pennant).

Plate 66, fig. B.

TYPE: The Pennant type came from Weymouth, and was in the Portland Cabinet.

DISTRIBUTION: Mediterranean Sea, Atlantic Ocean on the coasts of Northwestern Africa, Spain, France and England.

MATERIAL EXAMINED: One female infested with *Rhizocephalid* parasite dredged in 35 fms., 5 miles N. E. by N. of Cape Carthage, Gulf of Tunis, Mediterranean Sea, July 21, 1927.

TECHNICAL DESCRIPTION: Carapace box-like, one-third wider than long. Frontal margin approximately two-sevenths of the body width; relatively straight, median point faintly indicated by the ventral projection dividing the antennular fossae; the sidewalls are high; the anterolateral angles are very acute, outward directed, the lateral margins are distinctly convergent posteriorly; the posterior margin is wide, slightly sinuate. The dorsal surface is regularly punctate. Except the clearly defined urogastric line, the regions are but scarcely indicated. The female abdominal belt is of moderate width, oval, seven-segmented. The sternal plastron is wide, its sutures showing clearly. Orbital cavity elongate, filling the frontal margin, moderately wide, broadly concave distally for the reception of the large, convex cornea. The superior orbital margin is sinuate, more deeply concave

near the outer angle as is also the inferior orbital margin, which is beaded.

The pterygostomian region is moderately convex.

The eyestalk is cylindrical, finely punctate, the cornea spherical, terminal.

The antennulae have the basal joint greatly enlarged, flattish; the next two articles long, slender, cylindrical, the flagella small, unequal. The antennulae fold transversely within the septum.

The antennae have the fixed basal joint very small, squarish; the next article similar but slightly smaller, the third joint only half as large as the second, the flagellum consisting of about 20 tapering articles, totaling a length about equal to the eyestalk.

The external maxillipeds are moderately separated; the ischium is rectangular, almost squarish, with a submedian longitudinal groove; the merus is not quite as long as the ischium but has its distal margin oblique and its inner distal angle obliquely truncated, causing the merus to appear five-sided. The palp has the basal joint much stockier than the other two, which are successively tapering. The inner lateral margin of merus and ischium are heavily fringed with stiff setae.

The chelipeds are slightly unequal in the female; the merus is short, triquetral, with an acute spine about midway the outer lateral margin; the carpus is rounded, convex, with an acute spine on the inner angle; the palm is two-thirds as high as long in the smaller cheliped and four-fifths as high as long in the larger cheliped with the outer face slightly convex; the fingers are about as long, or a trifle longer than the palm, slightly deflected, tapering, meeting throughout their length; the cutting edge irregularly dentate; the tips curved.

The ambulatories have the meral joint much the longest and widest with a subdistal spinule on the anterolateral margin; the carpus is much narrower and one-third as long as the merus; the propodus is a third longer than the carpus and narrows distally; the dactyl is as long as the propodus and falcate.

Synonymy.—*Cancer angulatus* Pennant, Brit. Zoöl., t. IV, p. 7, pl. V, fig. 10, 1777.

Ocyspoda angulata Bosc, Hist. Nat. des Crust., t. I, p. 198, 1802.

Gonoplax angulata Leach, Edinb. Encycl., t. VII, p. 430, 1814.—Milne Edwards and Bouvier, Exped. Sci. du Travailleur et du Talisman, Crust. Décap., p. 106, 1900.—O. Pesta, Die Decapoden Fauna der Adria, p. 436, fig. 144, 1918 (and very full synonymy).

Speocarcinus carolinensis Stimpson, slightly enlarged.

Cancer rhomboides Herbst, Krabben u. Krebse, pl. I, fig. 12, pl. XLV, fig. 5, 1792.

Ocypoda rhomboides Bosc, Hist. nat. des Crust., t. I, p. 198, 1802.

Gonoplax rhomboides Desmarest, Consid. gen. sur la cl. des Crust., p. 125, pl. III, fig. 2, 1825.

Subfamily: **Prionoplacinae.**

Genus: **SPEOCARCINUS** Stimpson.

Speocarcinus carolinensis Stimpson.

Plate 67.

Diagnostic characters: Carapace very convex longitudinally, almost subcylindrical, nearly flat transversely, front about one-third of total width, weakly incised in median line; anterolateral margin with five teeth, including the postorbital, which is fused with the adjacent tooth, forming a wide truncated tooth, the remaining teeth are triangulate, separated from each other by wide U-shaped sinuses. Chelipeds nearly equal, those of male much larger than those of female, palms high, fingers long, deflected.

Type: Prof. Stimpson's type, which is no longer extant, came from Charleston Harbor, S. C., found in subterranean galleries excavated in mud at low water mark, presumably by other crustaceans or by large worms.

Distribution: South Carolina at Charleston southward to the West Indies.

Material examined: One male from Nipe Bay, tag 125, and one female dredged in 5 fathoms, south coast of Cuba, Feb. 15, 1924, tag 208, by the "*Ara*," William K. Vanderbilt, commanding, establishes the first Cuban record for the species. Three males and one female caught in Limon Bay, Panama, February 26, 1926, by the "*Ara*."

Technical description: Carapace very convex longitudinally, almost subcylindrical, nearly flat, transversely; frontal region equal to nearly one-third the width of the carapace, relatively straight, very weakly incised in the median line, the anterolateral margin is slightly rounded, armed with five teeth, including the postorbital; the first tooth is wide and shallow, united with the postorbital; the second tooth is broadly rounded but deeply incised; the third tooth is the longest

of the series, slightly outward and upward directed, acuminate; the fourth tooth is similar but smaller and more acuminate. The upper surface of the carapace is punctate and finely setiferous. The regions are very definitely delineated, the urogastric and cervical grooves being the most heavily impressed. The postlateral margins are distinctly convergent, and the posterior margin is relatively straight. The first and second abdominal segments are narrow, exposing the sternal plastron. The female abdominal belt is seven-segmented; the male has the third, fourth and fifth segments coalesced.

The orbit is oblong, marginal. The eyes are movable, the eyestalk tapers slightly distally; the cornea is terminal, a trifle smaller than the stalk, with a tongue-like projection of the stalk on its upper surface.

The external maxillipeds are well separated and have the meral joint of the endognath subquadrate with the inner distal angle notched for the reception of the palp.

The chelipeds are much larger in the male than in the female and are slightly unequal in the male. The meral point has an acute, subdistal spine on the upper lateral margin; the carpus is convex on the upper surface and has an acute tooth at the inner, upper angle and below this and more proximal in position a lesser tooth, about one-half to two-thirds as strong as the dorsal one; the propodus, including the fingers, is nearly as long as the greatest width of the carapace, the fingers being two-fifths of this length and strongly deflected; the palm is dilated, its height equal to three-fourths its greatest length, the outer surface slightly rounded, smooth; the fingers of the right cheliped are slightly stockier and are separated by a gape, each armed with a few weak teeth. The fingers of the opposite hand are slenderer, longer, with many teeth closed upon each other, the curved tips overlapping.

The ambulatories are slender, pubescent, subsimilar, except that the fourth pair have the dactyl curved upward; there are heavy fringes of setae on the dactyli, and also on the upper margins of the hand and finger of the cheliped.

Synonymy.—*Speocarcinus carolinensis* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 59, pl. 1, figs. 1-3, 1859.—Rathbun, Bull. U. S. Fish. Comm., vol. 20, pt. 2, p. 11, text fig. 2, 1901; Bull. 97, U. S. Nat. Mus., p. 39, pl. 8, pl. 159, fig. 6, 1918.

Chasmocarcinus latipes Rathbun. A, female; B, male; ×2.

Subfamily: **Rhizopinae** Miers.

Genus: **CHASMOCARCINUS** Rathbun.

Chasmocarcinus latipes Rathbun.

Plate 68, figs. A and B.

DIAGNOSTIC CHARACTERS: This is the only species of the genus so far described from the West Coast of America. The carapace is box-like, longitudinally convex, widest anteriorly. The eyes are directed obliquely forward when seen in a dorsal view. The meral joint of the ambulatories is wide.

TYPE: The female holotype comes from Magdalena Bay, Lower California, depth 51 fms., and is deposited in the United States National Museum.

DISTRIBUTION: Hitherto known only from the holotype. The southern range of the species is substantially extended to Cocos Island, by the *"Ara"* material and male specimens are for the first time recorded.

MATERIAL EXAMINED: Three females, two males, taken inshore, Wafer Bay, Cocos Island, Pacific Ocean, March 30, 1926, by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace box-like, longitudinally convex, widest posteriorly, lateral margins converging anteriorly; frontal margin relatively straight, equal to about two-fifths the frontal width, superior orbital margin deeply concave, directed obliquely forward and outward; the eye not quite filling the orbit; the anterolateral angle is rounded; the lateral walls are high and the lateral margins defined by a line which is granulate, as is also the posterior part of the carapace; the anterior region is covered by punctae. A pair of unusually deep longitudinal depressions, one on each side of the urocardiac region, separate it from the branchial region; the urocardiac line is clearly defined and posterior to the cardiac region is a deep little pit behind the longitudinal depression. There is a fine, sparse pilosity on the upper surface of the carapace which is much longer on the lateral walls and legs. The sternal plastron is wide in both sexes, its sutures sharply defined. The female belt is seven-segmented, oval, attaining its greater width in the fourth segment; the lateral margins of the second to sixth segments, inclusive, are broadly

rounded and well separated from one another. The male belt is narrowly triangular, five-segmented; the third, fourth and fifth segments being fully coalesced into one; the terminal segment is narrowed, triangulate.

The antennulae have the basal joints much enlarged, flattish; the second and third joints elongated, cylindrical.

The basal joint of the antennae is enlarged; the free articles are slender, tapering.

The eyestalks are small, tapering, movable. The cornea is terminal.

The chelipeds are distinctly unequal in the female and more pronouncedly so in the male. The merus is short, three-sided; the carpus is nearly square in outline, slightly convex on the upper surface, the inner lateral angle is weakly dentate in the female, less so in the male; the propodus is arched, the palm high, the fingers slightly longer than the palm, tapering, finely dentate, tips curved. In the female the large cheliped has the propodus nearly a third thicker than does the smaller one. The male has the large propodus nearly twice as high as the small one and much more inflated. Both lateral margins of the merus and propodus are fringed with long setae.

The ambulatories are long, slender; the third pair is the longest; the second pair almost as long as the third; the first pair are next in length, being scarcely three-fourths as long as the second pair; the fourth pair of legs are only a trifle shorter than the first pair and have the dactyli recurvate. All four legs have the meral joints about one-third wider than the related carpus. Both anterior and posterior lateral margins of all the legs are fringed with setae.

The external maxillipeds are set wide apart, the space between them being equal or slightly greater in width than one maxilliped. The ischium is subtriangular, with a single prominent longitudinal groove on its outer face; the merus is not quite as long nor as wide as the ischium and is subovate, set obliquely on the ischium; the palp is large, three-jointed, cylindrical; the inner lateral margins of the ischium and merus are fringed with setae as is also the distal joint of the palp.

Synonymy.—*Chasmocarcinus latipes* Rathbun, Proc. U. S. Nat. Mus., vol. 21, p. 602, pl. 43, fig. 5, 1898; Bull. 97, U. S. Nat. Mus., p. 57, text figs. 25 and 26, 1918.

Grapsus grapsus Linné, reduced one-third.

Family: **GRAPSIDAE.**

Subfamily: **Grapsinae.**

Genus: **GRAPSUS** Lamarck.

Grapsus grapsus Linné.

Plate 69.

NAME: "Sally Lightfoot"; rock crab.

DIAGNOSTIC CHARACTERS: Carapace vivid scarlet, discoidal; carpal spine ovate-acuminate; fingers spoon-shaped. Front vertical, depth in median line slightly greater than half its length.

TYPE: The type localities were given as America and Ascension Island. The type material is no longer extant.

DISTRIBUTION: "Sally Lightfoot" is a well-known inhabitant of the tropical and subtropical shores of America from Miami, Florida, southward through the West Indies and Bermudas to Pernambuco, Brazil, on the East Coast and on the West Coast from San Benito Island. Lower California, southward, including the Galapagos Islands, down to Chile; it is also known from the tropical eastern Atlantic, including the Azores and the west coast of Africa.

MATERIAL EXAMINED: One young female, one male taken along the tideline, Turtle Rocks, Bahamas. Seven specimens from Hood Island, Galapagos, several of which are egg-laden, March, 1928; four of these specimens are in the juvenile molt. One male, Wafer Bay, Cocos Island, March 5, 1928, taken by the *"Ara,"* William K. Vanderbilt, commanding.

COLOR: Adult male. Bright scarlet on the dorsal surface of the carapace and legs; the epistome is light orange yellow touched with scarlet; the pterygostomian region and underside of the carapace are neropalin blue streaked with light orange yellow; parts of the inner and under sides of the basal joints of the legs are neropalin blue; the merus, carpus and part of the propodus are bright scarlet; the distal part of the propodus and dactyli are light orange yellow; the chelipeds have these latter joints vivid scarlet. The eyestalks are yellow; the cornea is violaceous. The adult female has the same coloration as the male.

YOUNG: Male and female. The carapace is chocolate brown striated with light orange yellow and maculated with flecks of neropalin blue.

The chelipeds are predominently neropalin blue basally with the carpus and propodus vivid scarlet, the finger-tips orange. The ambulatory legs have the basal, meral and carpal joints light scarlet, musculated with light orange yellow; the propodus reddish-brown; the dactyl brownish-yellow, with black spines. The eyestalks are yellow, the cornea violaceous. The above notes were made from a color plate by Miss Isabel Cooper, staff artist of the Arcturus Expedition.

Habits: Nearly two hundred years ago, Catesby, in his "Natural History of Florida, Carolina and the Bahama Islands," gives the following account of this crab: "These crabs inhabit the rocks overhanging the sea; they are the nimblest of all other crabs; they run with surprising agility along the upright side of a rock and even under rocks that hang horizontally over the sea; this they are often necessitated to do for escaping the assaults of rapacious birds which pursue them. These crabs, so far as I could observe, never go to land, but frequent mostly those parts of the promontories and islands of rocks in and near the sea, where by the continual and violet agitation of the waves against the rocks they are always wet, continually receiving the spray of the sea, which often washes them into it, but they instantly return to the rock again, not being able to live under water and yet requiring more of that element than any of the crustaceous kinds that are not fish."

Technical description: Carapace discoidal; frontal border vertical, its depth slightly more than half its length; anterior dorsal interorbital surface with a median longitudinal groove which is posteriorly confluent with the mesogastric lines; a submedian notch and its slight posterior sulcus bisect each half of the frontal region. The postorbital tooth is acute; slightly behind it is a second sharp tooth, just anterior to the base of the latter the unusually deep cervical groove arises, proceeds diagonally to the urogastric region and thence runs posteriorly close together outside the cardio-intestinal region. The anterior frontal interorbital region is marked by irregular, transverse rows of low tubercles. There are twelve prominent, transverse, slightly arcuate ridges, the anterior of which begins at the inner basal angle of the anterolateral tooth and curves across the carapace to near the median dorsal area. All the transverse grooves become vague in the median dorsal region, where the oblique grooves defining the regions of the carapace predominate. The surface of the carapace between the grooves is decidedly reticulated, the subcentral region of the carapace

being marked with heavier longitudinal reticulations. There are a pair of depressions at the outer margin of the urogastric region.

The orbits are not quite half as long as the interorbital border, with a distinct notch near the inferior outer angle and a wide inner hiatus which is partly filled by the antennal peduncle, and partly by an isolated tooth. The eyestalks are cylindrical, with a distinct median constriction on the outer upper side and a rounded process projecting on the cornea, which is very convex, elliptical, set obliquely terminal.

The antennulae are set nearly transverse in narrow fossae and are partly concealed by the frontal border.

The antennal peduncle partly fills the orbital hiatus and has a conspicuous excretory tubercle on its basal joint; the flagellum is quite small and lies within the orbital hiatus.

The external maxilliped has a tapering rod-like exognath which is two-thirds as long as the endognath and bears on inner, thread-like flagellum about half as long as the basal rod; the ischium of the endognath is subrectangular with its inner margin fringed with setae, as long as the merus, the latter being a trifle wider distally than the ischium, and having its inner distal margin depressed; the palp arises from the antero-external angle and has an unusually large sublobate first joint which fits upon the distal border of the merus, and has its inferior distal margin produced; the second joint is much smaller but is distinctly three-sided; the third joint is quite small but thick and armed on its inner surface with a brush of setae. The maxillipeds are set wide apart from each other, showing the mandibles. This space between the maxillipeds at its widest point is one and one-half times as wide as the width of the maxilliped at the distal end of the ischium. The pterygostomian region is finely tometose. The abdominal belt consists of seven segments in both sexes.

The chelipeds (male) have the coxa produced to a tooth-like process at its outer distal angle; the basis is small and fused with the ischium; the latter is produced to a tooth-like process on its distal ventral margin and bears four or more sharp little teeth on its inner ventral margin; the merus is slightly longer than its distal width, three-sided with all three margins denticulate, the inner ventral one most pronouncedly so; the carpus is short, convex and denticulate on its outer margin, with a large, lanceolate acuminate tooth on its inner marginal angle; the propodus is high, subovate, convex on its outer surface, with a sharp, flat tooth at the upper distal margin near the propodal finger, with the upper edge of the propodus and half of the finger denticu-

late; below this are several irregular, flat tubercles; a longitudinal carina composed of bead-like tubercles runs from the base of the propodus to the inner angle of the propodal finger; a second, similar carina runs almost to the tip of the propodal finger; below this carina a series of ten oblique ridges, the distal of which are bead-like, ornament the lower outer surface of the propodus and lower finger; the fingers are subequal, spoon-shaped at the tip, the lower finger is armed with five teeth along the cutting edge, inside of which are a series of tufts of coarse setae; the upper finger is similarly toothed and tufted. The fingers meet only at the tips.

The ambulatory legs are similar, successively increasing in length posteriorly, the first pair being shorter than the second by the length of almost half the propodus and the dactyl of the latter; the third, fourth and fifth pairs increase in length by less than half the length of the dactyl. All except the first pair have the basal joint produced into a tooth-like process at both its inner and outer distal angles; the basis fused with the ischium, the latter produced to a tooth-like process on the dorsal anterior distal angle only on the fourth and fifth pairs of legs; all four pairs of legs have merus conspicuously dorsoventrally compressed, slightly more than twice as long as wide with the frontal margin ridge-like; the distal margin multidentate; the upper surface denticulated by many oblique striae; the carpus is half as long as the merus, very narrow basally and dilated distally, produced to an acuminate point on the anterior distal angle and longitudinally traversed by a wide, groove-like depression and two carinae. The propodus is about as wide but somewhat longer than the carpus, has a distinct longitudinal groove near its anterior margin and a series of spines and bristles on its postlateral margin; the dactyl is very powerful, terminating in a strong, claw-like tooth and armed with four longitudinal rows of strong, tooth-like, horny spines, the series successively increasing in size distally.

Synonymy.—*Pagurus maculatus* Catesby, Nat. Hist. Carolina, Florida and Bahama Islands, vol. 2, p. 36, pl. 36, fig. 1, 1743.

Cancer grapsus Linné, Syst. Nat., ed. 10, vol. 1, p. 630, 1758.

Grapsus pictus Latreille, Hist. Nat. Crust., vols. 6 and 7, p. 69, 1802 and 1803.

Grapsus webbi Milne Edwards, Ann. Sci. Nat., Ser. 3, Zoöl., vol. 20, p. 16 and p. 167 (133), 1853.

Grapsus goniopsus pictus DeHaan, Faun. Japon. Crust., p. 33, 1835.

Aratus pisonii (H. Milne Edwards), ×2.

Grapsus maculatus Milne Edwards, *ibid.*, p. 167, pl. 6, figs. 1-1n, 1853.

Grapsus ornatus Milne Edwards, *ibid.*, p. 168, 1853.

Grapsus altifrons Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, p. 230, 1860.

Grapsus grapsus Ives, Proc. Acad. Nat. Sci. Phila., p. 90, for 1891.—Faxon, Mem. Mus. Comp. Zoöl., vol. 18, p. 30, 1895.—Rathbun, Bull. 97, U. S. Nat. Mus., p. 227, pls. 53-54, 1917; Bull. Amer. Mus. Nat. Hist., vol. 48, p. 629, 1923.—Boone, Zoölogica, N. Y. Zoöl. Soc., vol. 8, No. 4, p. 244, fig. 90, 1927; Bull. Amer. Mus. Nat. Hist., vol. 58, No. 11, p. 577, fig. 13, 1929.—Rathbun, Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, Aflev. 23, p. 18, 1924.

Subfamily: **Sesarminae.**

Genus: **ARATUS** H. Milne Edwards.

Aratus pisonii (H. Milne Edwards).

Plate 70.

Diagnostic characters: Carapace trapezoidal, frontal margin very wide, four-lobed; front nearly vertical, entire. Chelipeds bristly outside.

Type: Prof. Milne Edwards' type came from the Antilles and is deposited in the National Museum d'Histoire Naturelle, Paris.

Distribution: Found near fresh, brackish or salt water in the mangrove roots, near the tide line. Known from southern Florida to Brazil on the East Coast, and from Nicaragua to Peru on the West Coast.

Material examined: One male taken on the shore at Catalina Creek, Cuba, tag 91, by the *"Ara."*

Technical description: Carapace trapezoidal, frontal margin very wide, orbits extending to the anterolateral margin; front vertical, four-lobed, about four times as long as deep; its lateral margins subparallel, the upper one margined by a line of granules, a decided median groove separating the wider outer lobes from the inner lobes; posterior to the outer pair is a smaller pair of lobes. The lower margin is divided by a median incision. The postorbital angles are acute; the lateral margins are carinate, convergent, the posterior margin is slightly rounded. There are a series of five or six, subpar-

allel carinae running obliquely in from along the posterior half of the lateral margin toward the postlateral angle; the regions of the carapace are sharply delineated; the frontal region and gastric lobes are granulose, the sides finely punctate, the remaining upper surface smooth, shining. The pterygostomian region is very finely and regularly beaded. The male abdomen is seven-segmented, subcircular, except for the last segment, which is abruptly narrowed with its distal margin rounded.

The antennulae fold transversely beneath the frontal margin.

The antennae are small and are excluded from the orbit by a broad rounded lobe.

The eyestalk is short; the cornea is large, terminal, highly developed.

The external maxillipeds are well separated, the distance between them being quite equal to the width of one maxilliped. The ischium is unequally suboval, the inner side being more convex than the outer; there is a distinct median channel on the outer face of the ischium; the merus is oblong oval, scarcely one-sixth longer than the ischium; with a distinct groove subparallel to the outer margin and a deeper groove obliquely channelling the median region; the palp is narrow, elongate, setiferous; the inner lateral margins of the maxilliped are also fringed with long, stiff setae.

The chelipeds are small, a sharp subdistal tooth on the upper ischial margin; the merus three-sided, granulose on the lower surface and margins; the carpus is convex, granulose. The propodus of the male is greatly dilated, convex, granulose and furnished with clusters of stiff bristles; the fingers are nearly as long as the palm, in the male gaping widely, the tips meeting, the inner edges weakly dentate; there are bristles on the proximal half of both fingers.

Ambulatories long, slender, successively decreasing in length posteriorly; meral joint oblong, suboval, one-third as wide as long, the anterior lateral margin with an acute distal and subdistal tooth; the upper surface roughly granulose; the carpus is elongated, narrowed basally, dilated distally with two longitudinally carinae; the propodus is about twice the length of the carpus and narrows distally; the dactyli are short, stout, less than one-third the length of the propodi, very acuminate; both lateral margins of the propodi and dactyli are set with stiff curved spines which assist the crab in its climbing.

Color: My field-notes made on specimens observed in southern Florida and in Cuba state that this crab is deep mottled bottle green on the body, the eyes velvety brown; the ambulatory legs green with

Percnon gibbesi Milne Edwards, natural size.

sharply etched reddish margins and tips; the chelae green with reddish lines; the finger-tips ocher yellow. According to Marcgrave de Liebstad, who first recorded and figured the species from Brazil, it is many colored, brown, blue, white, red, chelae whitish yellow at the extremities. I am inclined to think that possibly some of the colors he attributes to this species may really belong to species of *Sesarma,* unless the young of *A. pisonii,* like that of *Grapsus grapsus,* have a different coloration. This point is one worthy of the attention of future field workers.

SYNONYMY.—*Aratv prinima* MARCGRAVE DE LIEBSTAD, Hist. Rer. Nat. Brasil, lib. 4, p. 185, and text figure.

Sesarma pisonii MILNE EDWARDS, Hist. Nat. Crust., vol. 2, p. 76, pl. 19, figs. 4 and 5, 1837.

Aratus pisonii MILNE EDWARDS, Ann. Sci. Nat., Ser. 3, Zoöl., vol. 20, p. 187, 1853.—RATHBUN, Rapport betreffende een vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 340, 1907; Bull. U. S. Nat. Mus. 97, p. 323, pl. 96, 1918; Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, Aflev. 23, p. 18, 1924.

Subfamily: **Plagusiinae.**

Genus: **PERCNON** Gistle.

Percnon gibbesi Milne Edwards.

Plate 71.

NAME: Dedicated to Lewis R. Gibbes, an American carcinologist.

DIAGNOSTIC CHARACTERS: Carapace thin and ovate, disk-like, longer than wide, with the tubercles of the dorsal surface flattened. Inner surface of palm devoid of bristles. Meral joint of ambulatories of moderate size, not very wide, as compared to the Pacific species.

TYPE: The type came from the Antilles and is deposited in the Paris Museum National d'Historie Naturelle.

DISTRIBUTION: Subtropical and tropical shores of America, from Lower California to Chile on the west; from southern Florida, southward in the Bahamas, Bermudas, and West Indies to Brazil; the eastern Atlantic from the Azores to the Cape of Good Hope.

Color: The body of the crab is mottled brown, salmon and rosy flesh-color with a median longitudinal stripe of bright light blue; the under side of the body is pale blue. The legs are ringed with reddish-brown alternating with bands of light rose pink; on the under side they are entirely pinkish.

Material examined: One male, taken from pond in the middle of Sand Key, Dry Tortugas, Florida, November 27, 1923, by William K. Vanderbilt.

Technical description: Carapace oval, thin, flattish, disk-like, slightly longer than wide; regions feebly delineated; upper surface finely punctate and with an exceedingly fine coating of minute setae, a few widely separated low flat tubercles. The front, antennular and preorbital angles and epistome are all deeply, sharply spinose. The frontal region between the antennae is narrow, approximately twice as long as wide proximally, armed with a pair of acute forward pointing spines, one on each side midway the lateral margin, beyond which the rostrum abruptly narrows and curves downward and terminates in two acute, upcurved spines which are separated by a V-shaped space. There are three or four spinules on the proximal half of the rostral margin. The preorbital angle also terminates in a sharp, upcurved spine, equal to and in line with the distal rostral spines. Behind this on the preorbital margin is a second acute, up-pointed spine in line with and equal to the subdistal spine of the rostrum; a third smaller spine occurs behind the second; the outer half of the superior orbital margin is serrate with eight or nine small teeth; the postorbital angle is an acute tooth; behind it on the anterolateral margin are three subequal and subequally spaced acute teeth; the posterior lateral margin is slightly carinate. The epistome is armed with five acute spines; the submedian pair being slightly smaller than the other three; the outermost pair are visible dorsally and the median one would be except that it lies directly beneath the rostral horns.

The external maxillipeds have the ischium very large, subrectangular, with the inner angles rounded; its width about three-fourths of its length; the merus is very small, decidedly narrower than the ischium and set obliquely upon it; the palp is rather long, slender, conical, tapering and set with spinose setae, as is also the inner lateral margin of the merus and ischium. The exognath is rod-like, very slender, extending barely more than half the length of the ischium. The male belt is triangular, with the tip rounded; segments three to

five, inclusive, fused, forming one segment. The sternal plastron is wide and flat.

The antennulae are large and armed with spinulose setae on the exposed face of the long, cylindrical peduncular joint.

The antennae have the basal joint flat, suboval, with each distal angle acuminate, spinose; the median distal margin deeply excavate for the reception of the second joint which is subcylindrical and armed with a sub-basal spine on its lower face; the third joint is short, bulbous; the flagellum is fine, composed of fifteen or twenty tapering rings.

The eyestalk is short, cylindrical, with a short, semioval projection on the cornea, which is large, reniform.

The chelipeds are equal, of moderate size; the merus is three-sided, spinose along its anterior lateral margin and armed with acute spines at both anterior and posterior distal angles; anterior face of merus very setose; the carpus is convex and armed with eight to ten spines; the palm is smooth, suboval, three-fourths as high as long; the fingers short, deflected, with spoon-shaped tips meeting.

The ambulatories have the second and third pairs longest, subequal; the first pair next in length, extending three-fourths the length of the propodus of the second leg; the seventh leg reaches to scarcely midway the propodus of the third leg; the meral joints of the first three legs are each elongated; that of the first leg is not especially widened, but those of the second and third legs are one-third as wide as long; the meral joint of the fourth leg is also widened but is only half as long as the merus of the third leg; two flat, hairless, longitudinal carinae separated by a setose area on the upper surface of each meral joint; the anterior meral margins are set with a row of long, acute spines which slightly diminish in size towards the proximal end. On the first, second and third legs each a row of secondary spinules parallels the marginal row; this secondary row is absent on the fourth ambulatory; the posterior lateral margin of the meral joints terminate in an acute subdistal tooth.

SYNONYMY.—*Acanthopus gibbesi* MILNE EDWARDS, Ann. Sci. Nat. Ser. 3, Zoöl., vol. 20, pp. 180 and 146, 1853.

Leiolophus planissimus MIERS, Ann. Mag. Nat. Hist., ser. 5, vol. 1, p. 153 (part) 1878.

Percnon planissimum RATHBUN, Pro. U. S. Nat. Mus., vol. 22, p. 281, 1900, (part).

Percnon gibbesi RATHBUN, Rapport betreffende een vooloopig onderzoek naar de toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 341, 197; Bull. 97, U. S. Nat. Mus., p. 337, pl. 105, 1918; Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, Aflev. 23, p. 18, 1924.

Family: GECARCINIDAE Dana.

Genus: CARDISOMA Latreille.

Cardisoma guanhumi Latreille.

Plate 72.

NAMES: Gray land crab; mulatto land crab; tourlourou; gaunhumi.

DIAGNOSTIC CHARACTERS: A large species, adults bluish grey, occasionally with a greenish cast; young, violet to purple. Male appendages of the first abdominal segment with blunt extremity.

TYPE: Latreille's type came from Brazil and is deposited in the Paris Museum.

DISTRIBUTION: A land dwelling species, known from southern Florida, the Bermudas, the Bahamas, southward through all the West Indian Islands, along the coast of the Gulf of Mexico and down to Sao Paulo, Brazil. Bouvier has also reported this crab from West Africa.*

MATERIAL EXAMINED: One female from Miami Beach, Florida, February, 1922.

HABITS: The giant land crab of the southern United States, West Indian region and northern South America is gregarious, living both in open fields and wooded lands. It builds deep rambling tunnel-like burrows in the earth, usually near moisture. In these tunnels the crabs spend a great part of the day, venturing forth at night to obtain their food. In periods of drought the crabs will close the entrance to their tunnels with moist earth, in an effort to retain the moisture in the homes. In the breeding season they go down to the sea in vast numbers and deposit their eggs; the larval stages of the young are passed in the sea, but when they attain a length of one-quarter inch,

---

* FOOTNOTE.—Bull. Mus. Hist. Nat. Paris, p. 13, 1901.

Cardisoma guanhumi Latreille, male, one-half of natural size.

or thereabouts, the young crabs return to the land and soon after disappear into the brush. When they first leave the sea they are more reddish than violet, but the first moult after leaving the sea they become violaceous. Mystery surrounds the moulting of these crabs. It is really unknown whether they retire to the safety of their burrows for this ecdysis, or whether it takes place simultaneously with the breeding season, when they go down to the sea. Careful search over a period of eight months, August to May, in southern Florida failed to reveal a single shed, either on land or sea. Nor could I find a single native who could enlighten me on this point.

TECHNICAL DESCRIPTION: Carapace transversely cordate, decidedly convex from front to back; greatest width across the median gastric region equal to one and one-sixth times the length; lateral borders tumid. The anterolateral margin is defined by a carinate line which begins at a denticle just behind the orbital angle; this line becomes less distinct with age. The mesogastric and cardio-intestinal regions are sharply delineated by grooves. The interorbital space is equivalent to two-fifths of the frontal width of the carapace and is relatively straight, with a carinate edge which is continuous with the sinous superior orbital margin, which extends to the acute postorbital tooth; the greatest height of the orbit is equal to three-fifths of its length; the lower orbital margin is a carinate line. The sides of the front are oblique. The pterygostomian region is densely tomentose.

The antennulae are small and fold obliquely beneath the frontal margin.

The antennae have the basal article greatly enlarged, squarish, with the lateral margins a little convex and the distal one emarginate for the reception of the second article, which is much smaller; the basal article fits within the inner orbital sinus and touches the frontal margin. The flagellum is minute, hair-like.

The buccal cavern is elongate, squarish, one-sixth higher than wide. The external maxillipeds are well separated, the mandibles showing through the rhomboidal space between. The exognath is rod-like, densely tomentose, reaching to two-fifths the length of the merus; the ischium is a trifle longer than the merus, subquadrate, the inner lateral margins oblique, an oblique near the inner margin; the merus is roughly quadrate-oval, set a little obliquely when in repose, the inner margin rounded slightly more than the outer; the palp, which is almost entirely exposed, arises from near the outer distal angle of

the merus and folds around its distal and inner margin. The palp is tipped with a tuft of setae; the inner lateral margins are heavily setiferous.

The chelipeds are markedly unequal in both sexes; sometimes in old males the claw is of greater size than the body. The merus is three-sided; spinulose along the lateral margins; the carpus is convex on the upper surface, armed with an acute tooth at the inner angle; in old specimens this tooth is frequently obsolete; the propodus is high, suboval; the height of the palm in the female is equal to its length on the lower margin and exceeds that of its upper margin; the fingers of the larger claw are triangulate, gaping, spoon-tipped, with a few weak teeth. Those of the other hand are less or not at all gaping.

The ambulatories are slender, the second pair longer than the first and third, which are subequal; the fourth pair is shortest, scarcely reaching to the tip of the propodus of the third pair. All four pairs have the meral joint stout, slightly wider than the remaining joints. The carpus is one-half as long as the propodus, which is three-fourths as long as the merus; the dactyli are strong, slender, acuminate, as long as the propodus; both lateral margins are lightly carinated. The distal three joints are set moderately with tufts of bristly setae. The carpal and propodal joints are scarcely half as wide as the meral, slender, subcylindrical, setose; the carpus is scarcely half the length of the meral and is armed with a spine at its posterior distal angle; the propodal joint is approximately twice the length of the carpal; the dactyl is a trifle less than half the length of the propodus and is very acuminate, tipped and armed with a series of five or six horn-like spines on the inferior lateral margin; there is a cluster of similar spines at the inferior distal margin of the propodus.

The female abdominal belt is oval, seven-segmented; the sixth segment is more than twice as wide as the fifth, the distal segment is abruptly smaller, subtriangulate with its tip rounded.

The male belt is also seven-segmented and externally differs slightly from the female in that it is more triangular than oval; the sixth segment is practically twice the length of the preceding segment. The first pair of appendages are straight, stocky, triquetral, the tips slightly flattened laterally and rounded, each tip armed with an oblique, rounded appendage and above this a small, straight process which does not extend beyond the rounded extremity of the thickened portion.

Ocypode albicans Bosc, male, natural size.

SYNONYMY.—*Guanhumi* MARCGRAVE DE LIEBSTAD, Hist. Rer. Natur. Brazil, 1648, p. 185, with text figure.

Cangrejos terrestris PARRA, Descripcion de diferentes piezas de Historia Natural, Havana, p. 163, pl. 57, 1787.

Ocypode ruricola LATREILLE, Hist. Nat. Crust., vol. 6, p. 35, 1803, but not plate 24, fig. 2.

Gecarcinus carnifex LATREILLE, Nouv. Dict. Hist. Nat., vol. 12, p. 511, 1817.

Cardisoma guanhumi LATREILLE, Encyc. Méth. Hist. Nat. Entom., vol. 10, p. 685, 1825.—MILNE EDWARDS, Ann. Sci. Nat. Ser. 3, Zoöl., vol. 20, p. 204, pl. 9, 1853.—SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 143, pl. 5, fig. 3, 1870.—RATHBUN, Rapport betreffende enn vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 331, 1907.—VERRILL, *ibid.*, vol. 13, p. 310, text fig. 3 and pl. 9, fig. 1, 1908.—RATHBUN, Bull. 97, U. S. Nat. Mus., p. 341, pl. 106, 107, 1918; Bijdragen tot de Dierkunde, Natura Artis Magistra te Amsterdam, Aflev. 23, p. 18, 1924.

Ocypode (Cardisoma) cordata DEHAAN, Fauna Japon. Crust., p. 27, 1835.

Ocypode ruricola FREMINVILLE, Ann. Sci. Nat. Ser. 2, Zoöl., vol. 3, p. 217, 1835.

Ocypoda gigantea FREMINVILLE, Ann. Sci. Nat. Ser. 2, Zoöl., vol. 3, p. 221, 1835.

Cardisoma quadrata SAUSSURE, Mem. Soc. Phys. Hist. Nat. Genève, vol. 14, p. 438, pl. 2, fig. 13, 1858.

Cardisoma diurnum GILL, Ann. Lyc. Nat. Hist, vol. 7, p. 42, 1859.

Family: **OCYPODIDAE.**

Subfamily: **Ocypodinae.**

Genus: **OCYPODE** Fabricius 1798.

Ocypode albicans Bosc, 1801.

Plate 73.

Where Aphrodita's opalescent foam-bells ring and break in
echoing beauty,
Along the shelly shingle, dances the ocean-sprite, *Ocypode.*

NAMES: Ocean sprite; ghost crab; sand crab; shadow crab.

DIAGNOSTIC CHARACTERS: This is the only member of the genus known from the East Coast of the Americas. The fingers are pointed. The eyes are rounded apically; the outer orbital angle is usually less advanced than the front, but in occasional specimens it is about equal to the front.

TYPE: Bosc's type, which is no longer extant, came from "la Caroline."

DISTRIBUTION: *Ocypode albicans* is well known from the coast of New Jersey southward to Florida; along the coast line of the Gulf of Mexico and Central America, throughout the West Indies and Bermudas and along the South American coasts as far south as Santa Catharina, Brazil. It has been occasionally taken as far north as Rhode Island, and the megalops stage has been found in Vineyard Sound, Mass.

MATERIAL EXAMINED: Two females taken on the beach at Dry Tortugas, Florida, November 26, 1923.

HABITS: The rapidity and dexterity of the movements of the ghost crab, combined with its remarkable gift of protective mimicry make it one of the most strikingly interesting crustaceans of the East Coast. It lives in deep burrows near or above the high tide mark along the sandy beaches. These burrows are of two kinds: one consists of a single tunnel extending down into the sand for three or four feet, the other is similar but shorter and usually has one or more passages branching off from it which is used for escape. During most of the time, *Ocypode* lives on the land, going to the water only occasionally for the purpose of moistening the gills. Like most of the terrestrial Crustacea, it is partly nocturnal, hunting and feeding chiefly at night. It is both a scavenger, devouring unfortunate victims stranded by the tide and, in times of stress, a cannibal. It usually remains in the moist cool of its burrow during the middle part of the day. When pursued, it runs with astonishing rapidity, then stopping abruptly and flattening itself so closely into the sand, simultaneously assuming the coloration of the sand, that it is very difficult to distinguish.

The breeding season occurs in spring and early summer. Little is known of the early life-history of the species except that the advanced megalops stages have been taken in the plankton.

COLOR: This species possesses in marked degree the power of rapidly changing its color in mimicry of that of its surroundings, a fact which explains the various colors ascribed to it by different authors. Dr. Verrill states: "Color—pepper and salt, pale yellow, straw color or yellowish white, imitating the color of the beaches." This conforms to the present writer's observations made on a number of specimens in the West Indies and southern Florida. Occasional specimens taken from the spray were pale seafoam green.

TECHNICAL DESCRIPTION: Carapace subrectangular, interorbital space 5 mm. wide; upper border of orbit sinuous, produced to a rounded point at the distal end of the eyestalk, thence arcuate to the acute anterolateral angle; the frontal border is beaded or finely serrate; the lateral borders are slightly bowed anteriorly, but somewhat convergent posteriorly; below this convergent region the vaulted sidewalls of the carapace show in a dorsal view; the posterior margin is slightly sinuous at the ends but approximately subparallel to the anterior margin. The anterior part of the cervical groove, the mesogastric depressions, the urogastric and anterior cardiac regions are clearly delineated.

The orbit is very large and consists of two chambers; the lower consists of a border which has a triangular sinus below the outer angle, a notch midway and there is a short, triangular tooth near the base of the eyestalk. The eyestalk is very short, exceedingly flexible at the hinge and produced in a tongue-like projection on the upper surface of the cornea. The cornea is very large, shining black, convex distally.

The antennulae have only the basal joint visible; this is cylindrical, tapering distally, and is closely appressed in the space below the eye and adjacent to the produced frontal border. The basal joint is much enlarged and modified as an auditory organ.

The antennae are rudimentary; the first and second joints are small, fixed; the third joint is nearly as long as the first two, somewhat dilated distally; the flagellum consists of twelve tapering rings, of which the proximal two are much larger than the rest.

The external maxilliped has the exognath exceedingly narrow and tapering, reaching only to the base of the merus; the ischium of the endognath is rectangular, a third longer than broad; the merus is half the length of the ischium but much narrower distally, both the ischium and merus are transversed medially by a broad, shallow, longitudinal groove; the palp arises from the outer distal angle of the merus; the

first joint of the palp, which is dilated distally, lays above the distal margin of the merus, while the second and third joints of the palp are directed downward along the inner margin of the merus and ischium; the second joint is smaller and is only about two-thirds the length of the first, while the third joint is very slender, tapering and slightly longer than the first. The outer surface of the ischium and merus are coarsely granulose and sparsely set with short setae; the inner margin of the merus and ischium are thickly fringed with longer setae, the two distal joints of the palp bear a long, heavy brush. The lateral and frontal sides of the carapace are coarsely denticulate.

The male abdomen consists of seven segments.

The female abdomen consists of seven segments, the first to sixth inclusive successively increase in length, the fifth being nearly twice the length of the fourth and the sixth twice the length of the fourth; the seventh is very small, triangular. The second to fifth segments, inclusive, each bear a pair of biramous appendages. Each appendage consists of a short peduncular article, a long, curved, fringed outer branch and an inner branch consisting of a long, basal article directed diagonally towards the center and a distal branch which lies along the median line and consists of a long base and ten or twelve articulated, or semiarticulated annulations distally; the inner blade is also fringed with long setae.

The chelipeds are conspicuously unequal in both sexes. Both chelipeds are much shorter than the ambulatories. The first three articles are small, the merus of the large chela is three-sided with both ventral margins decidedly denticulate; the carpus is short, convex outwardly, with a pronounced spine on the inner margin; the propodus is high with the distal parts deflected, its outer surface is squamously tuberculate, the lateral edges, including those of the fingers, are serrate; the fingers are similar, subequal, traversed by two longitudinal carinae, the cutting edges not quite meeting except at the tips, and serrate with small teeth, the tips acuminate, slightly curved. The larger chela has a stridulating ridge that is composed of fourteen to sixteen tubercles and is not quite half as long as half of the greatest width of the palm. This ridge plays against a smooth carina on the distal part of the upper anterior margin of the ischium.

The ambulatory legs are quite long and have the upper surface reticulated; the meral joints are the longest and are rather broad, with the anterior margin finely carinate and serrate; the carpus is about half as long as the merus and much slenderer; the propodus is about

three-fourths as long as the merus. The dactyl is approximately as long as the propodus and is very slender, acuminate and carinated. The depressions between the carinae are setiferous. The second pair of legs is the longest, exceeding the first pair by slightly more than one-half the length of the dactyli, and the third pair by about one-third the length of the dactyli; the fourth pair are much smaller, reaching only halfway the propodus of the third pair. All ambulatory legs are heavily fringed with long, light yellow hairs.

There is a small, round branchial aperture situated between the bases of the third and fourth legs which have the posterior surface of the basal joint of the third leg closely appressed to the anterior surface of the basal joint of the fourth leg, both of these surfaces are flat and closely opposed; their distal margin is bordered by a dense fringe of setae, which appear to have an olfactory function. This aperture opens into the branchial cavity behind a rounded tubercle which is situated above the third leg, where a branchia is absent in *Ocypode*. Over this aperature a complete tube is formed by ridges which arise above the articulation of the legs and by the projection of the carapace. Water passes inward through these apertures, over the gills and out through the frontal aperture.

Synonymy.—*Cancer arenarius* Catesby, Nat. Hist. Carolina, vol. 2, p. 35, pl. 35, 1743.

Cancer vocans Linnaeus, Sys. Nat. ed. 10, vol. 1, p. 626, part, 1758.

Cancer quadratus Fabricius, Mant. Ins., vol. 1, p. 315, 1787; Ent. Syst. auct. et emend., vol. 2, p. 439, 1793.

Ocypode quadrata Fabricius, Ent. Syst. Suppl., p. 347, 1798.

Ocypode rhombea Fabricius, Ent. Syst. Suppl., p. 348, 1798.

Ocypoda albicans Bosc, Hist. Nat. Crust., vol. 1, p. 196, and X, 1801-02.—Latreille, Hist. Nat. Crust., vol. 6, p. 48, and XI, 1802-03.—Rathbun, Proc. Wash. Acad. Sci., vol. 2, p. 134, 1900; Bull. 97, U. S. Nat. Mus., p. 367, pls. 127 and 128, 1917; Rapport betreffende een vooloopig onderzoek naar den toestand van de visscherij en de industrie van zeeproducten in de Kolonie Curaçao, vol. 1, p. 342, 1907.

Ocypode arenarius Say, Journ. Acad. Nat. Sci. Phila., vol. 1, p. 69, 1817.

Monolepis inermis Say, *op. cit.*, p. 187.

Ocypoda arenaria MILNE EDWARDS, Hist. Nat. Crust., vol. 2, p. 44, pl. 19, figs. 13 and 14, 1837.—MIERS, Ann. Mag. Nat. Hist., ser 5, vol. 10, p. 384, pl. 17, figs. 7-7b, 1882.

Genus: **UCA** Leach.

Uca pugnax (S. I. Smith).

Plate 74, fig. C.

DIAGNOSTIC CHARACTERS: A small species; carapace extremely convex from front to back; eyebrow nearly vertical. Oblique ridge on the upper surface of palm very granular, terminating at the carpal cavity.

TYPE: The type was taken at New Haven, Conn., and is deposited in the Peabody Museum of Natural History, Yale University.

DISTRIBUTION: Eastern coast of the United States, from Provincetown, Mass., to New Orleans, La.

MATERIAL EXAMINED: Three males from the shores of the "Eagle's Nest," Northport Harbor, Long Island, N. Y., September 11, 1928.

TECHNICAL DESCRIPTION: Carapace very convex longitudinally, widest across the anterior median region. Frontal border scarcely two-sevenths of total fronto-orbital width; the superior orbital margin is sinuous, quite oblique, it and the front are margined by a flat carina; the lower orbital margin is coarsely dentate; the anterolateral angle is obtuse, not produced. Anteriorly the lateral margins are slightly convex and then abruptly run inward as a carinate line separating the high sidewall from the dorsal surface. The dorsal surface is glabrous, the H-shape depression deep; there is a pit behind the median orbital margin and another on the branchial region in line with the gastro-cardiac sulcus. The pterygostomian region is densely tomentose and the external maxillipeds are setiferous. The male belt is seven-segmented; the female belt is also, but is very wide, oval.

The antennulae and antennae offer no specific characters.

The eyestalk is slender, the cornea set obliquely terminal, oval, shining black.

The great cheliped of the male has the palm two-thirds as wide as the carapace and its height is equal to two-thirds of its own width; the outer face is moderately rounded, very granulose; the upper margin with a distinct beading. The oblique ridge on the inner surface of the palm terminates at the carpal cavity. The fingers are widely

A.—*Uca coloradoensis* Rathbun. B.—Female of same. C.—*Uca pugnax* (S. I. Smith), both slightly enlarged.

gaping about one and one-fifth times as long as the palm—in older males even longer; the upper finger is the longer, with the tip decidedly down-curved. The small male cheliped is weak, the finger spoon-shaped, for holding and sieving mud. The female chelipeds are weak, subequal, similar to the small one of the male.

The ambulatories are slender, decreasing in length in the order: 3, 2, 1, 4, the meral joint stout and long, the carpal and propodal joints very setose, the dactyli slender, long sharp.

Between the second and third ambulatories at the base is an aperture into the branchial cavity, which is guarded by a heavy tuft of close setae. This aperture permits the crab to control the water content of the branchial cavity.

SYNONYMY.—*Gelasimus vocans* GOULD, Rept. Invert. Mass., p. 325 (part), 1841.

Gelasimus vocans, variety A, DEKAY, Nat. Hist. New York Crust., p. 14, pl. 6, fig. 10, 1844.

Gelasimus pugilator LECONTE, Proc. Acad. Nat. Sci. Phila., vol. 7, p. 403, 1855.

Gelasimus palustris SMITH, Amer. Nat., vol. 3, p. 557, 1870.

Gelasimus pugnax SMITH, Trans. Conn. Acad. Arts and Sci., vol. 2, p. 131, pl. 2, fig. 1, pl. 4, figs. 2-2d, 1870.

Gelasimus vocator KINGSLEY, Proc. Acad. Nat. Sci. Phila., p. 147 (part), 1880.

Uca vocator ORTMANN, Zoöl. Jahrb. Syst., vol. 10, p. 352 (part), 1897.

Uca pugnax RATHBUN, Amer. Nat., vol. 34, p. 585, 1900; Bull. 97, U. S. Nat. Mus., p. 395, pl. 139, 1918.

Uca coloradensis (Rathbun).

Plate 74, figs. A and B.

DIAGNOSTIC CHARACTERS: This is a little species; the carapace has the frontal border one-fourth the width of the carapace; the lateral margins angled, straight anteriorly, then abruptly directed inward at the widest point. The male great cheliped has the upper surface of the palm at right angles to the outer face. The oblique ridge inside the palm is continued to the upper margin.

TYPE: The type was obtained by the U. S. Fisheries steamer *"Albatross"* at Horseshoe Bend, Colorado River, and is deposited in the United States National Museum.

DISTRIBUTION: Mexico—adjacent to the upper reaches of the Gulf of California and south to Canos Island, Costa Rica.

MATERIAL EXAMINED: One male and one female from Canos Island, Costa Rica, February 15, 1928, taken by the *"Ara,"* William K. Vanderbilt, commanding.

TECHNICAL DESCRIPTION: Carapace widest across the anterolateral angles; length three-fifths of this width; decidedly convex longitudinally; frontal margin straight; one-fourth of the greatest width of the carapace; orbital sinus long and wide, scarcely filled by the slender stalk, inferior margin visible for the greater part of its length in a dorsal view, coarsely beaded; superior orbital margin slightly sinuate and margined by a flat carina, which is also continuous across the frontal margin; anterolateral angles slightly peaked forward from a roof above the cornea when the latter is retracted. Lateral margins straight anteriorly, subparallel, then abruptly turned inward, a carinate line separating the side walls from the dorsal surface. Posterior margin straight; dorsal surface glabrous, sparsely, microscopically punctate. The H-shaped depression is very deep as is also the cervical groove. The pterygostomian region is densely tomentose. The male abdominal belt is seven-segmented, rather broad, with the tip rounded. The female belt is very wide, oval, with the seven segments sharply separated.

The external maxillipeds are convex on the outer surface, close-fitting into the margins of the buccal cavity, but with a distinct, setae-fringed space between the two halves. The exognath extends to the distal angle of the merus; the ischium is long, subrectangular, with the distal margin a trifle diagonal; the merus is scarcely half as long as the ischium, squarish, with a deep median longitudinal groove on its outer face, its distal margin emarginate; the palp arises from the outer distal angle, its basal joint is elongate, laminate, sinuate, fitting across the top of the merus; the second and third articles are stocky, cylindrical, setose, as are also the inner lateral margins of the merus and ischium, these setae forming a sieve-like arrangement across the space between the maxillipeds.

The eyestalk is long, slender; the cornea terminal, large, oval, shining black.

The antennulae have the basal article greatly enlarged reaching to the base of the eyestalk and the frontal margin; the free joints are much reduced and fold transversely within the fossett.

The antennae have the first free joint nearly as wide as long, with its distal margin furnished with numerous long, stiff setae; the next joint long, cylindrical; the flagellum half as long as the eyestalk.

The great cheliped of the male has the meral and carpal joints projecting beyond the body for a distance equal to the greatest width of the carapace; while the propodus, folded across in front of the animal, extends the tip of its fingers beyond the opposite side of the body; the height of the palm is nearly equal to its length in the median line; the outer and upper surfaces are smooth, moderately rounded; the proximal part of the inner face of the palm is excavate and fits upon the carpus, the upper proximal border of the palm folding above the carpus when reflexed, its margin granulate. The oblique granulate ridge on the inner surface of the palm is bent almost at right angles and is continuous to the upper margin. The lower finger is one and one-fifth times as long as the palm and the upper is one and two-fifths times as long as the palm, its tip distinctly down-curved. There is a very wide gape between them throughout their entire length; the cutting edge is finely dentate, one rudimentary tooth on each finger.

The small cheliped is one and two-thirds times as long as its adjacent ambulatory, has the palm small, the fingers weak, subequal, widely gaping. The chelipeds of the female are subequal, both very weak and similar to the small male cheliped.

The ambulatories are slender, decreasing in length in the following order: 3, 2, 1 and 4; each has the meral joint somewhat widened and roughened on the upper surface, with series of transverse granulae; the dactyli are slender, falcate, margined laterally with fine setae; a longitudinal groove on the outer lateral face.

Synonymy.—*Gelasimus coloradoensis* Rathbun, Proc. U. S. Nat. Mus., vol. 16, p. 246, 1893.

Uca coloradoensis Holmes, Occas. Papers Calif. Acad. Sci., vol. 7, p. 76; 1900; Rathbun, Bull. 97, U. S. Nat. Mus., p. 410, pl. 147, 1918.

INDEX FOR VOL. II

Acanthopus 211
  gibbesi 211
Achelous
  depressifrons 187
  gibbesii 174
  ordwayi 177
  sebae 179
  spinicarpus 185
  spinimana 182
  spinimanus 164
  xantusi 164
Acknowledgements 11
Alima 42
  gracilis 42
Amphitrite 187
  depressifrons 187
Anasimus 74
  latus (plate 20) 13, 74
Announcement 8
Arana 207
Ara 9
Aratus 207
  pisonii (plate 70) 17, 207
Aratv 209
  prinima 209

Bathynectes 153
  longipes (plate 51, fig. A) 19, 153
Brachygnatha 65
Brachyryncha 123
British Museum of Natural History 11

Calappidae 62
Calappa 62
  angustata 62
  flammea (plate 14) 12, 62
  granulata 64
  marmorata 64
Calcutta Museum 11
Callinectes 154
  diacanthus 156
  hastatus 156
  larvatus (plate 53) 15, 157
  marginatus 158
  marginatus larvatus 158
  sapidus (plate 52) 15, 154
Cancridae 148
Cancrinae 148
Cancer 148
  amaenus (plate 50) 17, 150
  angulatus 198
  arenarius 219
  corrugatus 169
  "four" 190
  (Mantis) arenarius 32
  borealis (plate 49) 15, 148
  cornudo 104
  coronatus 100
  coryphe 100
  dorsettensis 71
  facchino 47
  flammea 64
  furcatus 104
  forceps 190
  gonagra 145
  grapsus 206
  hispidus 91
  irroratus 17, 150
  lanatus 47
  longirostris 69
  maia 115
  marinus scutiformis 179
  mercenaria 132
  "nine" 110
  princeps 61
  punctatus 56
  quadratus 219
  sagittarius 66
  sayi 152
  scorpio 71
  seticornis 66
  squinado 115
  vocans 219
Cangrejo 104
  cornuda 104
  espinosa 97
  terrestris 215
Cardisoma 212
  diurnum 215
  guanhumi (plate 72) 17, 212
  quadrata 215
Carpilius 132
  corallinus (plate 43) 15, 132
Chasmocarcinus 201
  latipes (plate 68, figs. A, B) 19, 201
Chloridus 124
  floridanus 124
Chlorinus 104
  armatus 104
Collodes 76
  granosus (plate 21, figs. A, B) 76
Copenhagen Museum 11
Coryrhynchus 74
  riisei 74

Dasygius 78
depressus (plate 22) 18, 78
Dorippidae 45
Dorippe 45
lanata 47
lanatus 19, 47
Driope 74
falcipoda 74
Dromiacea 42
Dromidae 42
Dromidia 42
antillensis (plate 7, figs. A, B) 11, 42

Eagle 9
Eriphides 145
hispida (plate 48) 145
Eriphia 144
gonagra (plate 47, fig. B) 144
hispida 18, 148
squamata (plate 47, fig. A) 18, 143
Eriphinae 143
Euphylax 190
dovii (plate 65) 18, 190
robustus 190

Frevillea 197
tridentata 197

Gay, Hazel 11
Gecarcinidae 212
Gecarcinus 215
carnifex 215
Gelasimus 220
coloradoensis 223
palustris 220
pugilator 220
pugnax 220
vocans 220
vocator 220
Geographical distribution of species 11, 20
Glyptoxanthus 125
vermiculatus (plate 41, A, B) 14, 125
Goneplacidae 194
Goneplacinae 194
Goneplax 194
angulata (plate 66, fig. B) 197
tridentata (plate 66, fig. A) 16, 194
Gonoplax 198
angulata 20, 198
Gonodactylus 21
chiragra 24
gonagra variety oerstedii 24
oerstedii (plate 1) 11, 21
Grapsidae 203
Grapsinae 203
Grapsus 203
altifrons 207
goniopsis pictus 206
grapsus (plate 69) 17, 19, 203
maculatus 207
ornatus 207
pictus 206
webbi 206
Guaia 56
alia 56
punctata 56
Guanhumi 215

Hepatulus 60
princeps (plate 60) 12, 60
Hepatus 62
fasciatus 62
princeps 62
Heteractea 125
lunata (plate 40, fig. A) 18, 127
Hyas 80
aculeata 87
alutacea 82
alutaceus 82
bufonis 82
coarctata 82
coarctatus (plate 23) 17, 80
coarctatus variety alutacea 82
coarctatus variety latifrons 82
latifrons 82
serratus 82
ursinus 82

Introduction 9
Ilia 60
ornata 60
Inachinae 65
Inachus 70
dorsettensis (plate 18) 19, 70
longirostris 69
sagittarius 66
scorpio 71

Kirschner, Julius 11

Labrador-New England Fauna 17
Lambrus 117
agonus 117
crenulatus 119
granulatus 120
lupoides 119
melanodactylus 120
pontalesii 123
pourtalesii 123
serratus 119
verrilli 123
Leilophus 211
planissimus 211
Leptodius 123
floridanus (plate 38, figs. A, B) 14, 123

Leptopodia 67
canariensis 67
lanceolata 67
lineata 67
ornata 67
sagittaria 67
sagittarius 67
vittata 67
Leucosiidae 53
Leucosiinae 53
Libinia 84
canaliculata 85
distincta 85
dubia (plate 24, fig. B) 84
subspinosa 85
Lissa 82
fissirostra 82
Lobopilumnus 134
agassizii (plate 40, fig. B) ... 15, 134
agassizii variety bermudensis 136
Lophopanopeus 129
heathii (plate 41, figs. A, B) 129
Lupa 156
diacantha 156
forceps 190
gibbesii 174
hastata 156
pelagica 166
sayi 166
spinimana 182
Lupea 179
sebae 179
Lupella 187
forceps (plate 64, figs. A, B) 16, 187
Lysiosquilla 32
maculata (plate 3) 11, 29

Macrocoeloma 105
diacantha 110
diacanthus 110
eutheca (plate 32, fig. B) 14, 105
trispinosa 110
trispinosum (plate 33, figs. A, B, C, D) 14, 108
Macropodia 69
longirostris 69
rostrata 69
sagittaria 67
tenuirostris 69
Macropus 69
longirostris 69
sagittarius 66
scorpio 71
seticornis 66
?Maia 115
crispata 115
scorpio 71
Maia 113
verrucosa (plate 34) 19, 115
Maiidae 113
Maiinae 113
Maja 66
sagittaria 67
sagittarius 66
seticornis 66
spini-cinata 91
Majidae 65
Majinae 86
Matutidae 60
Mediterranean Fauna 19–20
Menippe 130
mercenaria (plate 42) 15, 130
Menippinae 130
Micropanope 137
spinipes (plate 44, fig. A) 137
Microphrys 110
bicornuta 113
bicornutus (plate 32, fig. A) 14, 110
Microrynchus 80
depressus 80
Milnia 112
bicornuta 112
Miner, Roy W. 11
Monolepis 219
inermis 219
Mithraculus 99
Mithrax (Mithraculus) 100
coronatus 100
coryphe (plate 30, fig. A) 14, 99
forceps (plate 30, fig. B) 14, 100
forceps hirsutipes 102
Mithrax (Mithrax) 81
acuticornis (plate 29, fig. A) 13, 93
caribbaeus 92
cornutus (plate 28, fig. B) 13, 96
depressus 92, 93
holderi (plate 29, fig. B) 13, 97
hispidus (plate 27) 13, 81
pleuracanthus (plate 28, fig. A) 13, 92
sculptus 100
"?"Mithrax spinicinctus 91
Monaco, h'Institute Oceanographique 11
Museu Paulista, Brazil 11
Museum of Comparative Zoology 11

Nemausa 95
Neorynchus 80
depressus 80
Neptunus 187
cruentatus 177
depressifrons 187
gibbesii 174

hastatus 157
ordwayi 177
sebae 179
spinicarpus 185
spinimanus 182
sulcatus 160
vocans 163
xantusi 164
New York Zoological Society 11
Nibilia 82
antilocapra 13, 82
Nichols, John T. 3

Ocypoda 198
albicans 219
angulata 198
arenarius 220
gigantea 215
Ocypode 215
albicans (plate 73) 17, 215
arenarius 219
(Cardisoma) cordata 215
quadrata 219
rhombea 219
ruricola 215
Ocypodidae 215
Ocypodinae 215
Omalacantha 112
hirsuta 112
Oost- Indische Zee Crabbe 66
Othonia 87
aculeata 87
anisodon 89
lherminieri 89
Oxyrhyncha 65
Oxystomata 45

Pagurus 206
maculatus 206
Paris, Museum National d'Histoire Naturelle 11
Parthenope 115
Parthenope (Parthenope) agonus (plate 35) 14, 115
Parthenope (Platylambrus) crenulata 120
Parthenope (Platylambrus) crenulatus 120
Parthenope (Platylambrus) pourtalesii (plate 37) 14, 120
Parthenope (Platylambrus) serrata (plate 36, figs. A, B) 14, 117
Parthenope (Platylambrus) serratus 120
Parthenopidae 115
Parthenopinae 115
Percnon 209
gibbesi (plate 71) 17, 209
planissimum 211
Pericera 112
bicorna 112
bicornis 112
bicornuta 112
cornuta 104
dicantha 110
diacantha 110
eutheca 108
trispinosa 110
Persephona 53
edwardsii (plate 10, fig. A) 18, 53
guaia 56
lamarcki 56
latreillei 56
punctata (plate 10, fig. B) 12, 54
orbicularis (plate 11, figs. A, B) 18, 56
Pilumnus 136
agassizii 136
andrewsi 140
brasiliensis (plate 45) 15, 137
floridanus (plate 46) 15, 141
lunatus 129
spinifer (plate 44, fig. B) 19, 140
spinipes 138, 141
Pisa 112
bicorna 112
galibica 112
purpurea 112
trispinosa 110
Pisinae 80
Pitho 86
aculeata (plate 25, fig. A, B) 13, 86
anisodon (plate 26) 13, 87
quadridentata 88
Plagusinae 209
Platycarcinus 152
irroratus 150, 152
Podochela 71
deflexifrons 74
hypoglypha 74
riisei (plate 19) 12, 71
spatulifrons 74
Podonema 74
hypoglypha 74
riisei (plate 19) 71
Podopthalminae 190
Poecilasma 148
inequilaterale 148
Portunidae 154
Portuninae 154
Portunus (Achelous) 177
depressifrons (plate 63) 16, 185
gibbesii (plate 59) 16, 172
ordwayi (plate 58) 16, 172
sebae (plate 60) 16, 177
spinicarpus (plate 62) 16, 183
spinimanus (plate 61) 16, 179

Portunus (Portunus) 158
corrugatus (plate 57) 20, 167
holsatus (plate 58, fig. A) 20, 170
sayi (plate 55, fig. B) 16, 165
sulcatus (plate 54) 15, 158
vocans (plate 55, fig. A) 16, 161
xantusi (plate 56, figs. A, B) 163
Portunus 169
carcinoides 169
corrugatus (plate 57) 168
forceps 190
lividus 172
longipes 154
marmoreus 172
pelagicus 166
strigilis 169
subcorrugatus 169
Prionplacinae 199
Pseudocarcinus 132
mercenarius 132
Pseuderiphia 148
hispida 148
Pseudosquilla 24
ciliata 28
ciliata variety occidentalis (plate 2) 11, 24

Randallia 59
ornata (plate 12) 18, 59
Raninidae 48
Raninoides 48
laevis lamarcki (plate 9, figs. A, B, C) 11, 18, 48
Rhizocephalid 197
Rhizopinae 201

Sacculina 70
neglecta 70
Sesarma 209
pisonii 209
Sesarminae 207
Southwick, W. H. 11
Speocarcinus 199
carolinensis (plate 67) 17, 199
Stenocionops 102
furcata (plate 31) 14, 102
Stenorynchus 68
longirostris (plate 17) 19, 68
sagittarius 67
seticornis (plates, 15, 16) 12, 65
tenuirostris 69
Squilla 21
alba (plate 5) 12, 32, 34, 39
arenaria 31
chiragra 24
ciliata 28
glabruiscula 32
gracilis 12
maculata 31
mantis (plate 4) 12, 32
panamensis variety B. (plate 6) 17, 39
stylifera 28
vittata 32
Squillidae 21

Tropical American Pacific Fauna 17
Titcomb, Margaret 11

Uca 220
coloradoensis (plate 74, figs. A, B) 19, 222
pugnax (plate 74, fig. C) 17, 220
vocator 220

Vanderbilt Marine Museum, ... 6, 9
Vanderbilt, William K. 6, 9
Vanderbilt, Mrs. William K. 2

West Indian Fauna 11–17

Xanthidae 123
Xantho 132
mercenaria 132
vermiculatus 127

Ziska, Helen 11

FEB 3 1983

QH1
.V28
v.2
Bulletin of the Vanderbilt
AUTHOR
Museum. Vol. II
Library,
U. S. Fisheries Biological Station,
Seattle, Washington.